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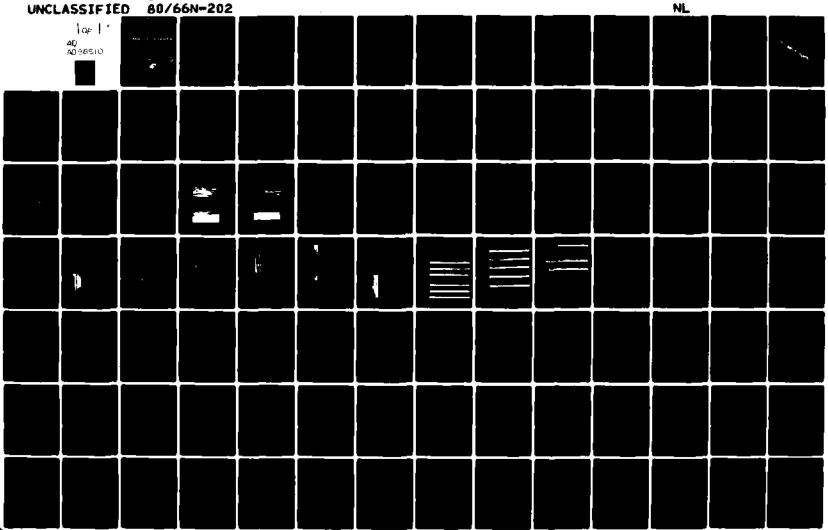

AIR FORCE COMMUNICATIONS COMMAND

TRACALS EVALUATION REPORT.

SSILS INITIAL EVALUATION REPORT,

AN/GRN-29 RUNWAY 16,

Dyess AFB, Texas,

~~80/66~~N-202

31 January - 26 February 1980.

DEPARTMENT OF THE AIR FORCE
1866 Facility Checking Squadron
Scott AFB, Illinois

16 June 1980

SSILS INITIAL EVALUATION REPORT

AN/GRN-29 RUNWAY 16

Dyess AFB, Texas

80/66N-202

31 January - 26 February 1980

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents the results of the 31 January - 26 February 1980 Traffic Control and Landing Systems (TRACALS) Evaluation of the Dyess AFB AN/GRN-29(V) SSILS serving Runway 16. The evaluation was conducted to determine the capabilities and limitations of the system in its installed environment. Results presented in this report can be used as a guide to anticipated performance until there is a significant change in ground equipment, siting environment, screening, or operational use.

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1. SUMMARY

1-1. Evaluation Profile. The TRACALS Evaluation of the Runway 16 AN/GRN-29 SSILS was conducted to define the system's capabilities and limitations in its installed environment. The evaluation consisted of three phases: ground equipment checks, facility siting, and flight evaluation. The equipment tests and checks conducted during the ground evaluation were accomplished in accordance with AFCSP 100-61, Volume XIX, ILS Test Procedures. The facility siting was evaluated in accordance with the siting criteria set forth in FAA Order 6750.16A, Siting Criteria for Instrument Landing Systems. The flight evaluation was conducted in accordance with the procedures in AFM 55-8, United States Standard Flight Inspection Manual, Section 217.

1-2. Solid State Instrument Landing System (SSILS):

a. AN/GRN-30 Localizer:

(1) Equipment Performance. The equipment was operating satisfactorily, with only minor out-of-tolerance conditions corrected by local maintenance personnel. Terrain irregularities in front of the localizer array had a significant effect upon system performance.

(2) Evaluation Results. The localizer is providing accurate instrument runway alignment in support of the present Dyess AFB mission. Course and clearance ground phasing was accomplished prior to the flight evaluation. The localizer is adequately sited 1841 feet from the stop end of Runway 16 on the extended runway centerline. As directed by HQ AFCC, we investigated the possibility of EMI with the positive interlock system for dual AN/GRN-30 localizers. The Dyess dual AN/GRN-30 system showed out-of-tolerance structure in the vicinity of the opposite dummy loaded localizer caused by the EMI. The 1.5° ground check points were found to be actually 2.0°. This error results in all the ground check points from 1.5° to 10.0° being annotated with incorrect values. One far field phasing point was missing. These phasing points are used to phase the localizer and verify phasing on the ground.

(3) Capabilities and Limitations. The localizer provides satisfactory service as a Category I facility. Category II operation is not possible due to excessive structure.

b. AN/GRN-31 Glide Slope:

(1) Equipment Performance. The equipment is operating in a capture effect configuration with several out-of-tolerance conditions remaining. These conditions did not appear to have any significant adverse impact upon the evaluation.

(2) Evaluation Results. The glide slope is adequately sited 1204 feet from threshold of Runway 16 and 400 feet right of runway centerline. The terrain's adverse effect upon the radiated path has been minimized by using capture effect configuration. The final path width and angle were 0.70° and 2.60°

for transmitter one and 0.71° and 2.57° for transmitter two respectively. The glide slope antennas were moved to lower the glide angle closer to the commissioned angle of 2.60°. This resulted in the need to reposition the near field monitor. The glide slope to Runway 16 is restricted because of course reversals. NAVAIDS maintenance does not have an adequate Portable Field Detector (PFD) for maintaining the glide slope, a common problem Air Force wide.

(3) Capabilities and Limitations. The glide slope provides restricted service as a Category I facility. Some items were not optimized during the flight evaluation, but they did not appear to affect overall system operation. The glide slope cannot provide unrestricted Category I service due to course reversals.

c. AN/GRN-32 Middle Marker. The middle marker was not evaluated.

1-3. Power Systems. Primary and backup power sources were adequate and reliable at both facilities.

2. RECOMMENDATIONS

2-1. Solid State Instrument Landing System (SSILS):

a. Recommend correcting the problem with localizer EMI Positive Interlock System, a Sacremento Air Logistic Command (ALC) Engineering Project. Also consideration should be given to putting the SSILS systems on separate frequencies (see Appendix III, para 1c(3)).

b. Recommend the localizer near field ground check points be correctly identified (see Appendix III, para 3b(1)(e)).

c. Recommend a localizer 3° far field ground check point be installed in the 150 Hz side (see Appendix III, para 3b(1)(f)).

d. Recommend additional troubleshooting be accomplished on the glide slope monitor instability problem (see Appendix III, para 3b(2)(a)).

e. Recommend all necessary thruline wattmeter elements be ordered (see Appendix III, para 3a(3)(d)).

f. Recommend the 1993 CS position the glide slope near field monitor antenna to the location specified in the TO (see Appendix III, para 4b(2)(b)).

2-2. Power Systems. No recommendations.

3. PERFORMANCE PREDICTIONS. The results of this evaluation can be used as a valid guide to the anticipated performance of the Runway 16 SSILS until there is a significant change in ground equipment, siting, mission requirements, or horizon screening. The AN/GRN-29 should continue to provide adequate service as a restricted Category I facility.

APPENDIX I

GENERAL INFORMATION

1. Facility Data:

a. General

Location: Dyess AFB, Texas
Communications Area: Strategic Communications Area (SACCA)
Unit: 1993 Communications Squadron
Evaluation Period: 1 January - 26 February 1980

b. SSILS

(1) AN/GRN-30 Localizer

Coordinates:	32° 23' 50.72" N 99° 50' 55.90" W
Site Elevation:	1789.91 feet MSL

(2) AN/GRN-31 Glide Slope

Coordinates:	32° 26' 07.17" N 99° 51' 32.41" W
Site Elevation:	1782.85 feet MSL
Antenna Heights:	Lower 15.29 feet AGL Middle 31.42 feet AGL Upper 49.75 feet AGL

2. Runway Data:

Airfield Coordinates:	32° 25' 52.3" N 99° 50' 57.4" W
Airfield Elevation:	1789 feet MSL
Magnetic Variation:	8.0° E
Instrument Runways:	16/34

3. Mission Area. The Dyess AN/GRN-29 SSILS for Runway 16 provides approach guidance from the north with localizer guidance from a maximum of 18 Nautical Mile (NM) at 4000 feet MSL. The glide slope provides instrument descent guidance from 10 NM at an angle of 2.60°. The Dyess location map is shown on page A1-1.

4. Mission Responsibility. The Dyess Runway 16 SSILS is responsible for providing accurate and reliable descent and runway alignment information to all properly equipped aircraft within the areas outline above. Within the current Category I operational parameters, the SSILS can provide guidance to aircraft to within 0.8 NM of the runway, from a glide slope intercept altitude of 3500 feet MSL. The ILS approaches are shown in Attachment 2.

5. Primary Using Agencies/Aircraft Supported. The primary using agencies at Dyess are the 96th Bombardment Wing, Strategic Air Command (SAC) with B52D and KC-135 aircraft, and the 463rd Tactical Airlift Wing which has C-130

aircraft. Additionally, the 47th Fighter Training Wing Detachment operates T-38 aircraft in their support of the SAC Accelerated Copilot Enrichment (ACE) Program. Beside the primary using agencies, numerous transient aircraft use the Dyess facilities.

6. ATC Facilities. The Dyess AFB Air Traffic Control System is comprised of a Visual Flight Rules (VFR) control tower equipped with a Bright Radar Indicator Tower Equipment (BRITE II) and two AN/GRN-29 SSILS systems.

7. Logistics Support. Logistical support, including test equipment calibration, is provided by host base organizations.

APPENDIX II

KEY PERSONNEL

1. Ground Evaluation Personnel:

Capt J. Coyle - Team Chief/Electrical Engineer
TSgt G. Crist - NAVAIDS Evaluation Technician
TSgt D. Thibodeau - NAVAIDS Evaluation Technician
TSgt G. Carroll - NAVAIDS Evaluation Technician
TSgt N. Culver - Geodetic Surveyor
SSgt J. Giron - Geodetic Surveyor

2. Airborne Evaluation Personnel:

Capt E. Jobson - Pilot
Capt C. Gustafson - Flight Inspector/Pilot
Capt D. Orth - Flight Inspection/Pilot
Capt R. Kleinhans - Pilot
Capt G. Jenkins - Pilot
Capt M. Pruden - Pilot
SMSgt L. Moore - Flight Inspection Technician
MSgt L. Dillingham - Flight Inspection Technician
MSgt G. Youngblood - Flight Inspection Technician
TSgt D. Byrd - Flight Inspection Technician
TSgt J. Hynes - Flight Engineer
SSgt H. Smith - Flight Engineer

3. Facility Personnel Contacted:

Col R. Houghton - Commander 96 BW
Col W. Jones - Deputy Commander, Operations 463 TAW
Lt Col W. Einsel - Airfield Manager
Maj C. Bass - Commander 1993 CS
Capt T. Robinson - Chief, ATC Operations
2lt G. Pellett - Chief of Maintenance
MSgt D. Carroll - Maintenance Support Supervisor
SSgt R. Roberson - NCOIC NAVAIDS Maintenance
SSgt C. Boysworth - NAVAIDS Maintenance Technician

APPENDIX III

SOLID STATE INSTRUMENT LANDING SYSTEM

1. System Description:

a. General. A solid state instrument landing system provides properly equipped aircraft with precise alignment and descent guidance information while on final approach to landing. Distance information is provided through the use of marker beacons placed at up to three specific points along the ILS course. Aircraft utilizing this system are operating at near critical speeds over a decreasing terrain clearance in all weather conditions. The equipment is designed for unattended operation with automatic switch-over to a standby transmitter should the main become unusable. The control tower is provided with remote control capability, status indications, and identification monitoring (localizer only). See Figure 3-1 for a pictorial description of a composite ILS.

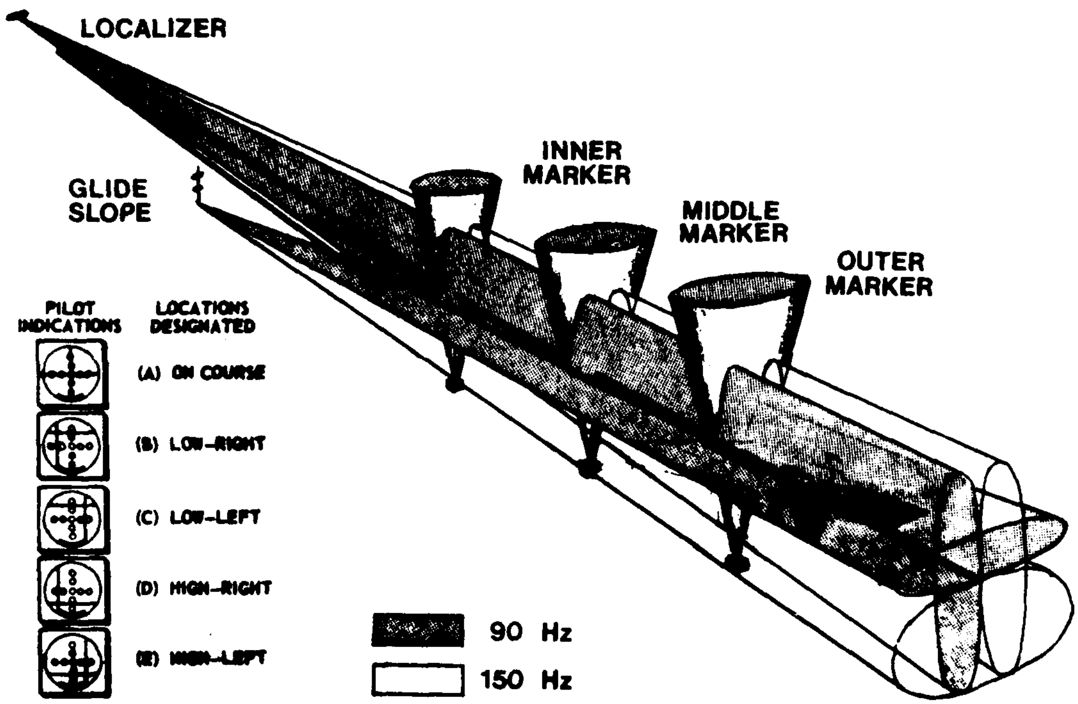


Figure 3-1
Instrument Landing System

(1) Localizer. The localizer is a capture effect system that radiates a lateral guidance signal consisting of two modulated Radio Frequency (RF) frequencies (from 108.1 thru 111.9 Megahertz (MHz)) transmitted simultaneously, with a nominal separation of 9.5 kHz. These signals are called the course, which is 4.75 Kilohertz (kHz) above the assigned station frequency, and the clearance, which is 4.75 kHz below the assigned station frequency. The course signals form the lateral guidance and are adjusted for a tailored width for Category I or II operation. The clearance signal complements the course by providing a signal in areas not covered by the course and also suppresses false courses generated by the course antenna radiation pattern.

(2) Glide Slope. The glide slope system provides the descent guidance or glide path portion of the SSILS. It transmits in the frequency range of 329.3 thru 335.0 MHz. The equipment can be configured in three basic ways: null reference, capture effect, or sideband reference. The choice of configuration depends upon particular site requirements due to terrain or other factors affecting the glide path. The null and sideband reference systems utilize a single RF carrier frequency to form the glide path. The Dyess Runway 16 glide slope operates in the capture effect configuration. In capture effect, two RF carrier frequencies (course and clearance) are used to form both the glide path and a below path lobe. The clearance signal provides a strong fly-up signal covering roughness in the below path sector. The course signal is 4.0 kHz above and clearance signal is 4.0 kHz below the assigned station frequency.

(3) Marker Beacons. The Runway 16 SSILS utilizes a middle marker operating at 75 MHz, with a modulated tone of 1300 Hz composed of alternate dots and dashes.

b. Facility Equipment:

(1) AN/GRN-30 Localizer, SN 770011

(2) AN/GRN-31 Glide Slope, SN 770011

(3) AN/GRN-32 Marker Beacon, SN 770006

c. Environmental Factors:

(1) Siting Characteristics. The facility siting was evaluated to ensure the localizer and glide slope were optimally located, and to identify any terrain deficiencies or features that may cause degradation to the radiated signals. The site evaluations were based on guidelines provided by FAA Order 6750.16A, Siting Criteria for Instrument Landing Systems.

(a) Localizer. The localizer is situated along the runway centerline 1841 feet from the stop end of Runway 16. The ground between the localizer and the runway surface is relatively flat with a slight downslope in the direction of the runway. A dirt road runs between the localizer and runway. Since this road receives only occasional use, traffic is not a problem.

(b) Glide Slope. The glide slope is located 1204 feet from threshold and 400 feet right of centerline. This position places the glide slope reflection plane in a rainwater runoff channel for the runway. The first Fresnel Zone is largely confined to an area which has only the lateral slope toward the runway. This and configuring the glide slope as a capture effect system have minimized the effects of irregular terrain (see Attachment 5).

(2) Evaluation Weather Conditions. Weather conditions during the flight evaluation were not considered to be a significant factor affecting flight data collection. Weather data has been omitted for this reason.

(3) Electromagnetic Environment. An EMI problem was found with the Runway 16 localizer signal when the localizer to Runway 34 was radiated

into a dummy load. Out-of-tolerance structure (in excess of 75 Microamp (uA)) existed in the vicinity of the Runway 34 localizer. Structure runs were made against the Runway 16 localizer when it was dummy loaded and the localizer to Runway 34 was off. Results show significant amounts of radio frequency leakage from the changeover unit (results of EMI runs can be seen in Attachment 9). Two possible solutions exist for this problem. Put the two ILS's on different, non-interfering frequencies or redesign the changeover unit.

2. Evaluation Overview.

a. Ground Test. Detailed equipment checks were performed prior to the airborne phase of the evaluation to ensure that the SSILS was operating within TO specifications. The equipment parameters that did not meet TO specifications are identified in Section 3, Equipment Status.

b. Siting. A site survey was performed to characterize the terrain features at both sites. This information was compared with the applicable TO tolerances to gain an insight into the areas that impact on the formation of the radiation pattern.

c. Airborne Tests. The airborne tests were accomplished using a Navigational Aids Flight Inspection System (NAFIS) equipped C-140A aircraft and a Radio Telemetric Theodolite (RTT). The flight plan was designed to collect the data necessary to characterize the system in its installed environment. The airborne parameters that were checked are listed in the flight profile as follows:

(1) Localizer

(a) Course Percent of Modulation
(b) Course Modulation Balance
(c) Clearance Percent of Modulation
(d) Clearance Modulation Balance
(e) Composite Percent of Modulation and Modulation Balance
(f) Normal Course Width and Symmetry
(g) Course Phasing (Radial Run 3^o)
(h) Course Phasing Arc (20^o - 0^o - 20^o)
(i) Clearance Phasing (Radial Run 30^o)
(j) Clearance Phasing Arc (35^o - 0^o - 35^o)
(k) Monitor Alarms
1. Course Narrow - Clearance Normal
2. Course Narrow - Clearance Wide
3. Course Wide - Clearance Normal
4. Alignment Monitor
5. Usable Distance (RF Alarm)
(l) High Angle Clearance
(m) Course Alignment and Structure

(2) Glide Slope

(a) Course Percent of Modulation
(b) Course Modulation Balance
(c) Normal Path Width and Angle
(d) Path Width and Angle at Localizer Extremities
(e) Phase Verification

(f) Monitor Alarms
   1. Narrow Alarm
   2. Wide Alarm
   3. Below Path Clearance
   4. Attenuate Middle and Upper Antenna
   5. Dephasing Checks
   6. Usable Distance (RF Alarm)
(g) Structure
(h) Antenna Nulls

3. Equipment Status:

a. General. Equipment checks were performed in accordance with AFCSP 100-61, Volume XIX ILS Test Procedures and applicable TOs. These checks ensured the equipment was operating within TO specifications and collected data on the present operation of the facility. Additionally, the check identified possible corrective actions necessary to improve the system.

b. Facility Equipment:

(1) Localizer. All initial performance checks were satisfactory with the exception of the clearance monitor one width lower Difference in Depth of Modulation (DDM) alarm point. This alarm point was out of tolerance and immediately corrected by local maintenance personnel. Localizer equipment and subsystem performance checks are shown in Attachment 7, Ground Check Data is shown in Attachment 8.

(a) Course Phasing. The phasing of both course transmitters appeared to be less than optimum when measured in the far field. As the phasing procedure used at commissioning was not known, phasing was accomplished in the far field using TO procedures. The airborne evaluation indicated that transmitter one was very close to being optimally phased. The phasing of transmitter two, though not as close to optimum, would require a further minor adjustment. Local maintenance personnel are competent and could perform this adjustment during any scheduled maintenance period. A further discussion of the airborne phasing checks is contained in para 4b(1)(d), this Appendix. Ground check graphs of the initial and final phasing are contained on pages A8-6 thru A8-9.

(b) Clearance Phasing. The phasing of both clearance transmitters was less than optimum. The clearance phasing was adjusted just prior to the flight evaluation. Graphs of the initial and final ground check readings are contained on pages A8-10 thru A8-13.

(c) Antenna Nulls. Using the present TO procedures for measuring the RF nulls, several pairs indicated out of tolerance. Broad minimums, usually caused by unequal power distribution to the antennas of a pair, make determination of the exact null placement very difficult. Since the composite null was in tolerance, no adjustments were made to the antenna feedlines. An additional check of the null placement was performed using the clearance distribution. The null locations for the clearance radiation pattern can be seen on page A7-6.

(d) Course and Clearance Distribution Unit (DU) Checks. The result of the distributions unit amplitude and phase checks are contained on pages

A7-5 and A7-6. Several amplitude reading were high and out of tolerance. The clearance DU phase error spread was out of tolerance at 19° (15° maximum). The individual effects of these out of tolerances cannot be determined at this time. The overall radiation pattern does not appear to be adversely effected by these out of tolerances.

(e) Near Field Ground Check Points. The ground check points are located approximately 1000 feet from the array on the overrun of Runway 16. The TRACALS Surveyor verified the displacement of the ground check points from runway centerline. This survey data indicated that from 1.5° to 10° the points are incorrectly marked. The 1.5° point is actually 2° and each point thereafter is plus 1°. The ground check data presented in Attachment 8 is based on the actual displacement from centerline. Recommend the ground check points be correctly marked using the most economical means available. Additional points should also be surveyed at 1.5° and 3.75° either side of centerline to be used for course and clearance width verification.

(f) Far Field Ground Check Points. The far field ground check points are most beneficial in verifying course width and phasing. The 3° point in the 150 Hz side could not be found. Recommend that this missing point be replaced.

(2) Glide Slope. The results of the glide slope initial performance checks are shown on pages A11-1 thru A11-4. The following out of tolerances were noted.

(a) Clearance Monitor Instability. Both clearance monitors were intermittently unstable on either transmitter. The RF level and percent of modulation would climb steadily higher and then return to normal. These two indications tracked inversely, as RF level reading went up, the percent of modulation reading went down, and the two monitors tracked together. This problem existed before the TRACALS Evaluation and could not be corrected by the evaluation team. This problem does not cause equipment downtime as the clearance percent of modulation and RF level do not have upper alarm point limits. Recommend further investigation of this problem by the 1993 CS. If the problem cannot be resolved at the local level, SACCA assistance should be requested.

(b) Course Width Monitor Alarm Points. Both width monitor alarm adjusted tight and out of tolerance. The narrow alarm point was adjusted to TO specifications and no problems were encountered during the flight evaluation. The TO specified wide alarm point of 0.145 $\pm$ 0.002 DDM produced an unsatisfactory width during the flight evaluation (advance -retard middle antenna). The wide alarm point was reset to 0.155 DDM and facility passed flight inspection.

c. Positive Interlock EMI Study. 1866 FCS/TE was tasked to perform a special study of the reported EMI with the positive interlock of the AN/GRN-29. The reported EMI was apparent when operating the opposing ILS in Standby on transmitter into dummy load). 1866 FCS/TE developed tests to determine the presence, the source, and the amount of EMI.

(1) Determining the Presence of EMI. The first test was to determine if any signal was being radiated from the antenna array when the system was operated in standby-on (main transmitter off and standby operating into the

dummy loads). The PFD was positioned 5 feet from the center of the course array and indicated a field strength reading of -31 Decibel (dBm). This verified that the Runway 16 localizer would produce EMI. This same test was reaccomplished at the Runway 34 localizer with virtually the same results.

(2) Determining the Source of the EMI. The inputs, both course and clearance, to the transfer switching unit were dummy loaded. No indication could be obtained on the PFD, positioned in front of the array. The outputs of the thruline bodies were dummy loaded and again there was no indication on the PFD. The signals were then dummy loaded at the dummy load outputs of the coaxial relays. The PFD indicated -31 dBm and it appears the source of the EMI is the coaxial relays.

(3) Amount of EMI. The PFD and vector voltmeter were used to measure the amount of signal at the output of the transfer switching unit (see page A9-1). The PFD was then used to determine how far from the array useable signal strength (-87 dBm) could be obtained. Sufficient signal strength was obtained 3^{o} either side of centerline at the ground check points (1000 feet from the array). A graph of this ground check can be seen on page A9-2. A ground check was also performed at the rear of the array. Sufficient signal strength could not be obtained until within 200 feet from the array. As no ground check points were available, no DDM readings were recorded.

d. Supporting Test Equipment Status. The local AN/GRM-103, PFD, and vector voltmeter did not function correctly and the evaluation was completed using TRACALS test equipment. Additionally, there is only one set of thruline elements available for both localizer facilities. If maintenance is required on one localizer and the elements are not at the facility, a delay in restoral would be encountered. At the glide slope facilities, a 10 watt element is being used in place of a 5 watt element. Correct element size is essential in confirming the performance specifications of the amplitude and phase control unit. Recommend the 1993 CS order all necessary elements to further their maintenance capability.

4. Analysis of Evaluation:

a. Ground Phase. An analysis of the results of the localizer and the glide slope equipment test indicate that the equipment was not responsible for degraded system performance.

b. Flight Phase:

(1) Localizer. The flight evaluation verified adequate siting, satisfactory coverage and course structure of the localizer. The localizer flight inspection graphs are seen in Attachment 14. The official flight inspection report is in Attachment 13. The localizer meets Category I tolerances.

(a) Course and Clearance Percent of Modulation and Balance. The tolerance for course and clearance percent of modulation is 18% to 22% (20% optimum). The course percent of modulation was 19.8% and 19.9% for transmitters one and two, respectively. Clearance percent of modulation was 19.9% for both transmitters. Modulation balance for the course was 0 uA for both transmitters. Clearance modulation balance was 2 uA/90 Hz for transmitter one and 0 uA for transmitter two.

(b) Course Width and Symmetry. The final course width with the equipment in normal configuration was 3.00° for both transmitters. The commissioned width is also 3.00°. The final course symmetry was 47%/90 Hz on transmitter one and 50% for transmitter two.

(c) Clearances. Localizer clearance runs were flown in sectors one and two to ensure adequate clearance signals existed, see Figure 3-2. The low clearance points were 290 uA/28° on the 150 Hz side and 250 uA/18° on the 90 Hz side for transmitter one and 315 uA/8° on the 150 Hz side and 255 uA/18° on the 90 Hz side for transmitter two. These values were well above the minimum values specified in AFM 55-8. Results of the clearance arcs can be seen on pages A14-1 and A14-5.

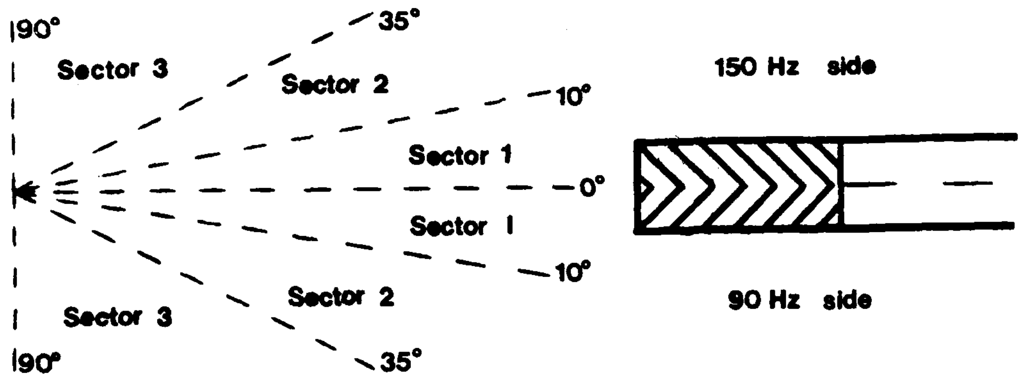


Figure 3-2
Localizer Clearance Sectors

(d) Phasing:

1. Course Phasing. The course phasing had been adjusted using ground procedures prior to the airborne evaluation. Several airborne checks were then employed to verify the course phasing. A radial run was flown at 3° in the 90 Hz side and indicated 4 uA/150 Hz (0 uA optimum). An arc was then flown to 20° either side of centerline. Experience has shown that optimum phasing is indicated when the crosspointer reads 0 uA between approximately 5° either side of centerline (see page A14-2). The next check of the course phasing was to advance and retard the sidebands a known and equal amount. When the phase was advanced and retarded 30°, the width widened from the normal of 3.00° to 3.50°. The above checks indicated transmitter one is nearly optimally phased. The phasing of transmitter two was checked using the radial run at 3° and the arc 20° either side of centerline. The results of the arc can be seen on page A14-6. Transmitter two's course phasing appears to be slightly less than optimum. This misphasing had no significant effect on the flight evaluation.

2. Clearance Phasing. The clearance phasing had been adjusted prior to the airborne evaluation using ground procedures. A radial run at 30^{o}/90 Hz and an arc 35^{o} either side of centerline were flown to verify the clearance phasing. The results of these runs indicated the clearance system is less than optimumally phased. A ground check performed after the flight evaluation confirmed that the clearance phasing had changed. This slight misphasing had no significant impact on the system performance as the clearance values were all above 250 uA.

(e) Monitor Alarm Checks. Localizer monitor checks are accomplished to ensure the monitors will detect changes in course alignment, width, and power which may degrade the system performance to an unacceptable or dangerous level.

1. Alignment. The course alignment monitor is required to detect shifts of the course line from its optimum position by no more than 15 uA for a Category I system. Transmitter one alarmed at 10 uA when shifted into either the 150 Hz or 90 Hz side. Transmitter two alarmed at 9 uA in the 150 Hz side and 10 uA in the 90 Hz side. These alarm points meet AFM 55-8 requirements for a Category I facility.

2. Course Wide and Narrow Alarms. The course width monitor should alarm when the width changes by no more than 17% of the commissioned width. The Dyess Runway 16 localizer has a commissioned width of 3.00^{o}. During the TRACALS Evaluation the localizer alarmed at 2.50^{o} for transmitter one and 2.65^{o} for transmitter two for the course width narrow alarm condition. In the course wide alarm condition, transmitter one alarmed at 3.30^{o} and transmitter two at 3.45^{o}. The allowed course width change is 2.49^{o} to 3.51^{o} ($\pm$17% of 3.00^{o}).

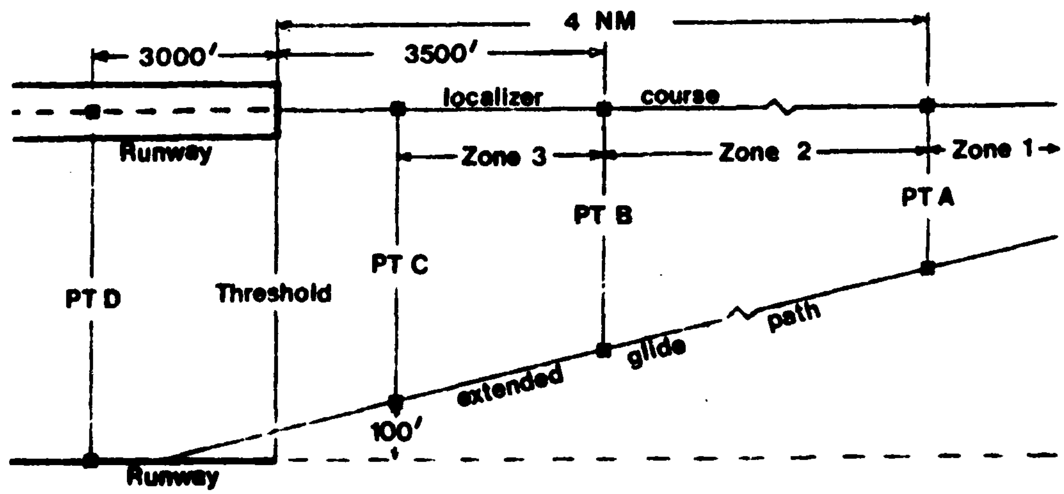


Figure 3-3
ILS Reference Points and Zones

3. RF Power. The power check is conducted in conjunction with the usable distance check. With the system in RF power alarm, the flight check crew flew against the system to verify the existence of at least 5 uV of signal strength existing at all ranges at which the lcoalizer is to be used (18 NM in this case). The localizer met the requirements for RF alarm to the extent of its required coverage range.

(f) Structure. The maximum course structure for transmitter one was 0 uA/5.5 NM in Zone 1, 2 uA/0.7 NM in Zone 2, and 3 uA/0.5 NM in Zone 3. Transmitter 2 showed maximum structure of 8 uA/5.5 NM in Zone 1, 6 uA/1.4 NM in Zone 2, and 6 uA/0.2 NM in Zone 3. AFM 55-8 allows up to 30 uA displacement from the average on course in Zone 1, a linear decrease from 30 uA to 15 uA in Zone 2 and up to 15 uA displacement in Zone 3. Structure was good in all three zones for Category I, but not for Category II operation.

(g) Course Alignment. Course alignment for both transmitters was centerline or 0 uA. At the centerline ground check point, the PFD measured 0.008 DDM/150 Hz for transmitter one and 0.007 DDM/150 Hz for transmitter two. Course alignment was satisfactory for Category I operation.

(2) Glide Slope. The official flight inspection report of the glide slope is in Attachment 13. Graphs from the glide slope flight inspection recordings are seen in Attachment 15. The flight evaluation revealed that the glide slope is adequate sited and meets the tolerances of a Category I facility.

(a) Antenna Nulls. By radiating carrier power from each antenna separately, the angles at which the automatic gain control (AGC) nulls for each antenna appear can be observed on the flight recordings of level inbound runs flown by the aircraft. These null positions depend upon the glide slope antenna heights and are directly related to the glide path angle. For the Dyess Runway 16 glide slope, the measured antenna heights originally were 15.3 feet, 29.9 feet, and 45.9 feet, lower, middle and upper antennas respectively. These heights produced RF carrier nulls at 5.28° for the lower antenna; 2.75° and 5.30° for the middle antenna; and 1.92°, 3.68°, and 5.40° for the upper antenna. The composite signal from all three antennas at these heights produced a glide angle of 2.73°. Since the desired glide angle was 2.60° the middle and upper antennas were raised to 31.42 feet and 49.75 feet, middle and upper antennas respectively. The lower antenna height was not changed. These new heights produced nulls at 2.60° and 5.00° for the middle antenna and 1.83°, 2.27°, and 5.00° for the upper antenna. Ideally the nulls should be 1.73°, 3.46°, and 5.20° for the upper antenna; 2.60° and 5.20° for the middle antenna; 5.20° for the lower antenna. Terrain irregularities made it impossible to have every null fall at its correct position. For this reason it was decided to adjust the first nulls of each antenna until each was correctly positioned or at least nearly so. This method of null placement positioned the first null for the middle antenna and the maximum of the first lobe (between first and second null) for the upper antenna at the same position in space as they theoretically should be. The glide angle obtained in this manner was 2.60°, the desired glide angle.

(b) Near Field Monitor Position. Changing the glide slope antenna heights changed the TO specified near field monitor position. This means the near field monitor is now incorrectly positioned. It might be possible that a small glide

angle change caused by other than a signal DDM change, RF power level change, or misphase condition, such as a change in the glide slope antenna heights or a reflecting plane change, will go unnoticed in some cases. This means the monitor should be repositioned to the optimum point to allow optimum monitor operation.

(c) Modulation and Modulation Balance. The final modulation was 80% (both transmitters) which is optimum. Modulation balance for both transmitters was 0 uA which is also optimum.

(d) Airborne Phasing. The airborne phasing was accomplished on transmiter one and verified on transmitter two. Transmitter one phasing was accomplished using airborne phasing procedure number 1 of AFM 55-8/AFCS Sup 1 (Change 2) para 217.3312(2) a thru g. Phasing was adjusted to obtain an average as close to 0 uA as possible. Airborne phasing did not result in an optimumly phased system. Results of ground phasing were even worse and attempts at ground phasing were abandomed.

(e) Normal Width, Angle and Symmetry. The final width and angle measurements were 0.70° width for transmitter one with an angle of 2.60°. For transmitter two the width was 0.71° with an angle of 2.57°. Symmetry was 46%/90 Hz for transmitter one and 48%/90 Hz for transmitter two.

(f) Monitor Alarms:

1. Path Width Alarms. AFM 55-8 requires the width monitors to alarm for an increase to not more than 0.90° and a decrease to not more than 0.50° in the approach envelope. The narrow alarm occurred at 0.57° and 0.54° for transmitters one and two respectively. The wide alarm occurred at 0.85° and 0.79° for transmitters one and two respctively. This is within AFM 55-8 tolerances. With the path in narrow alarm the glide angle was 2.67° for transmitter one and 2.64° for transmitter two. For the path width wide, the glide angle was 2.67° for transmitter one and 2.63° for transmitter two. Structure below path was satisfactory. Width alarms are satisfactory.

2. Path Width Alarm due to Misphasing. The path width monitor is required to alarm with a change in the phase relationship of the radiated Course Plus Sideband (C+SB) and Sideband only (SBO) components. This change in phase must cause an alarm condition before the path width goes out of tolerance. When the middle antenna was advanced 19° on transmitter one (20.5° on transmitter two) the path width change was 0.90° (0.81° for transmitter two). The middle antenna was retarded 22° for transmitter one (18° for transmitter two) which resulted in a path width of 0.73° for both transmitters. With the middle antenna advanced, the path angle was 2.65° for transmitter one (2.64° for transmitter two). With the middle antenna retarded the path angle was 2.68° for transmitter one (2.67° for transmitter two). Structure below path was unsatisfactory in both the advance and retard condition. Clearances below path, however were satisfactory. System operation in dephase condition was satisfactory.

3. Attenuate Middle and Upper Antenna to Alarm. With the middle antenna attenuated to alarm the path angle for transmitter one was 2.67° (2.61° for transmitter two) and the path width was 0.82° for transmitter one (0.77° for transmitter two). These values are well within tolerances. Structure below path was out of tolerance but below path clearance was satisfactory. The middle antenna attenuated check was satisfactory. With the upper antenna

attenuated to alarm the path angle for transmitter one was 2.62° and 2.64° for transmitter two with the path width of 0.68° for transmitter one and 0.66° for transmitter two. Structure below path was satisfactory. Upper antenna attenuated checks were satisfactory.

(g) Transverse Tilt:

1. A transverse tilt in the terrain is a tilt towards or away from the runway. Because formation of the glide path is dependent upon the terrain in front of the facility, a change in terrain that deviates from the ideal flat and level will cause a change in the glide angle. Transverse tilt will cause a corresponding tilt in the glide angle.

2. To examine the effect of transverse tilt, the flight inspection aircraft flew width and angle runs along the localizer course extremities. Terrain profiles at the localizer extremities are shown on page A5-4. Graphs of the width and angle runs at the localizer extremities are shown on page A15-5. The path angles measured by the aircraft were 2.82° on the 150 Hz side and 2.62° on the 90 Hz side. AFM 55-8 allows up to a 7.5% deviation from the measured angle, or here, 2.67 ± 0.20°. The angle in the 150 Hz side is in tolerance but barely.

(h) Usable Distance. Usable distance is verified in conjunction with the RF power alarm checks. With the RF level lowered to alarm, the facility was flown against to verify the existence of at least 15 uV signal strength, 240 uA flag current and 150 uA of fly-up condition on the crosspointer from a point 10 NM from the facility until the interception of the lower sector of the glide path. Checks were conducted for each transmitter while on course and while flying to 8° either side of course. The results of the usable distance checks were satisfactory.

(i) Structure/RTT:

1. Glide path structure is a measurement of the magnitude of abberations (roughness, scalloping and bends) from the actual path and the graphical average path. Structure is annotated as the maximum course deviation in Zones 1, 2, and 3. Figure 3-3 is an illustration of the ILS reference points and zones. Pages A15-11 and A15-12 contain graphs of the flight inspection recordings of the RTT structure runs for both transmitters. These plots show good structure exists in spite of irregular terrain located in front of the glide slope antenna (see Attachment 5). The structure meets the overall tolerances for a Category I facility in accordance with AFM 55-8.

2. Structure in Zone 2 is measured as the maximum displacement from the actual path average while structure in Zones 1 and 3 are measured from the graphical average path. The actual path angle is calculated by averaging the values of the recorded trace every two seconds. For transmitter one, the maximum structures were; Zone 1 2 uA/7.0 NM, Zone 2 18 uA/1.0 NM, and Zone 3, 11 uA/0.3 NM. For transmitter two, the maximum structures were; Zone 1, 2.0 uA/6 NM, Zone 2, 17 uA/0.6 NM, and Zone 3, 7 uA/.03 NM. In all three zones, 30 uA structure is allowed.

(j) Threshold Crossing Height (TCH)/Terminal Instrument Procedures (TERPS) Data:

1. A computer program was developed to compute the equation constants, the coefficients of determination, and various other methods of comparison between the actual data and these models. The program also models the average angle method presented in AFM 55-8, para 217.33141, and AFCS Supplement 1 to AFM 55-8, para 217.5(14)(b)(3) and (50). The RTT structure runs for Dyess AFB are plotted in Attachment 15. The results of the computer analysis is presented in Attachment 17.

2. Table 3-1 summarizes the results of the RTT structure analysis. The equation constants for each run were used to calculate the height of each model at the runway threshold. The Average Angle, Linear, and Power Models are referenced from the base of the glide slope antennas, so their distance to threshold is 1268.71 feet. The Hyperbolic Model is referenced from the point on the runway centerline abeam the glide slope, so its distance to threshold is 1204 feet.

3. To arrive at the experimental value for TCH, we use the curve heights at Points A and B, as shown in Figure 3-4, and project a straight line back to the runway threshold to find the TCH. Point B is assumed to be on the straight

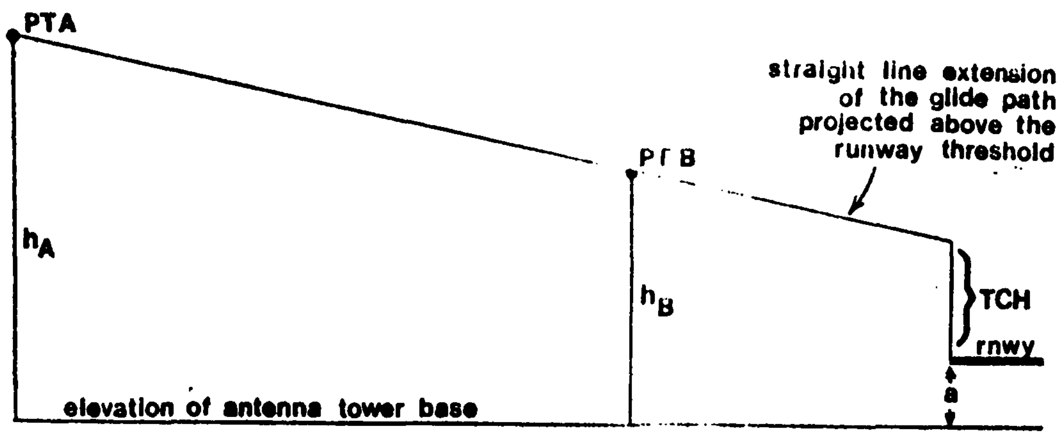


Figure 3-4
Determination of TCH from the Computer Results

line portion of a glide path. The maximum error incurred by this assumption is less than 1%. The baseline shown in the figure represents the elevation of the antenna tower base, from which all elevations are referenced in the computer program. The value for TCH can be found from the following equation derived from Figure 3-4.

$$TCH = \frac{24304h_B - 3500h_A}{20804} - a$$

Where h_A = Curve height at Point A
h_B = Curve height at Point B
a = Threshold elevation - antenna pad elevation

The TCH values for the Linear Model are presented in Table 3-1. TCH values for the other models are shown for comparison.

TABLE 3-1

RTT STRUCTURE ANALYSIS RESULTS

	AVERAGE ANGLE (feet)	LINEAR MODEL (feet)	POWER MODEL (feet)	HYPERBOLIC MODEL (feet)
CHAT*	56.98	49.72	54.48	57.42
	57.62	47.78	54.96	58.06
	56.78	58.02	56.47	56.78
	59.97	49.60	54.80	57.19
CHAT* AVERAGE	57.84	51.28	55.18	57.36
ANGLE IN DEGREES	2.57°	2.62°	-----	2.59°
	2.60°	2.66°	-----	2.62°
	2.56°	2.56°	-----	2.56°
	2.57°	2.62°	-----	2.58°
ANGLE	2.58°	2.62°	-----	2.59°

* CURVE HEIGHT ABOVE THRESHOLD

4. The value for TCH in the facility data sheets was computed incorrectly. The correct value is 52.26 feet, using AFM 55-9 Figure 129A (sloping terrain condition) for negative sloping runways. The average TCH found with the Linear Model is 51.28 feet. The calculations of AFM 55-9, Figure 129 (pedestalled runway condition) for negative sloping runways yield a TCH value of 48.16 feet. Although the glide slope site for Runway 16 exhibits characteristics of both sloping terrain and pedestalled runway conditions, the experimental TCH value found with the Linear Model shows the glide slope to be functioning under sloping terrain conditions.

Therefore, the calculations in AFM 55-9, Figure 129A for negative sloping runways will provide correct and accurate values for TCH, Ground Point of Intersect (GPI) and Runway Point of Intersect(RPI).

Several other entries in both the localizer and glide slope facility data sheets are in error. These proposed TRACALS changes should be incorporated in the facility

data sheets, as shown in Attachment 6, denoted by an asterisk.

5. The angle averages in Table 3-1 show the glide slope has about a 2.60° glide angle. The angle average for the power model is not considered in this case since the slope of the power curve is constantly changing. Assuming a 2.60° glide angle the theoretical threshold crossing height is 54.67 feet. The average angle and linear models yield calculated TCH's of 57.84 feet and 51.28 feet respectively. These models are chosen for the TCH analysis because they are straight lines, a concept agreeing with the definition of TCH as a straight line extension of the glide path above the threshold. The experimental data presented indicates the glide slope facility is correctly sited and the equipment properly adjusted to produce the desired glide angle and TCH for Runway 16.

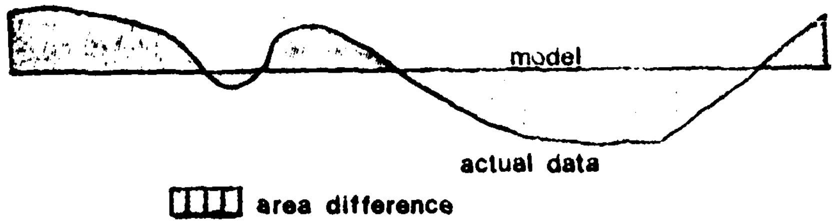


Figure 3-5
Determination of Area Difference Between Curves

APPENDIX IV

POWER SYSTEMS

1. System Description:

a. The AN/GRN-29 SSILS receives input power from three sources: commercial power, a backup generator, and batteries. Primary power is supplied commercially to the facility through a converter. The converter provides 27 VDC to the system and a trickle charge to the facility batteries. When the primary power fails, the facility batteries assume the load until the backup generator is operational. Once the generator assumes load, the batteries are once again run in parallel with the converter and the rest of the system. If the generator should fail, the facility should operate on battery power for a minimum of three hours.

b. The SSILS on Runway 16 is supplied primary power commercially. Each facility employs a 15 kW Onan generator with automatic changeover as a backup power source.

2. Evaluation Overview. The power systems checks were performed in accordance with AFCSP 100-61, Volume XIX, ILS Test Procedures, Attachment 4. The purpose of these checks were to verify the adequacy of AC power distribution while using primary and backup sources.

3. Equipment Status. All power systems for the SSILS performed satisfactorily during the evaluation period. Power failures were simulated and the batteries supplied the equipment until the generator started. At the Localizer facility, it took the generator 38 seconds to start and transfer the load. At the glide slope facility, it took 48 seconds for the generator to start and transfer the load.

4. Analysis of Evaluation. The results of the evaluation indicate the primary and backup power sources for the SSILS on Runway 16 are adequate and reliable.

TITLE:

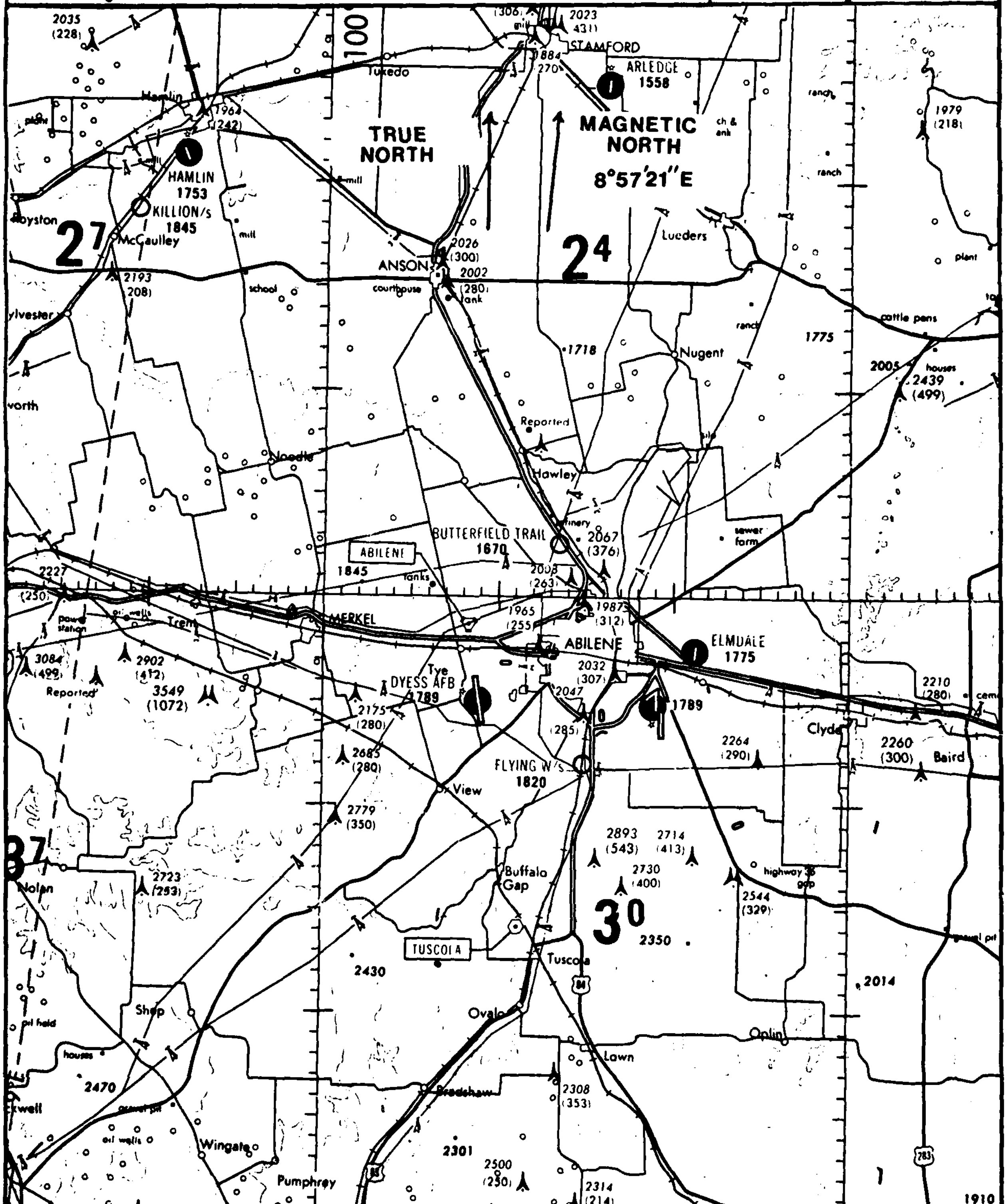
LOCATION MAP

LOCATION

Dyess AFB

DATE

February 1980



REMARKS

SCALE 1:500,000 BASE COORDINATES: 32°25' 52.3"N
99 50' 57.4"W

TITLE:

INSTRUMENT APPROACH PROCEDURE

LOCATION: Dyess AFB

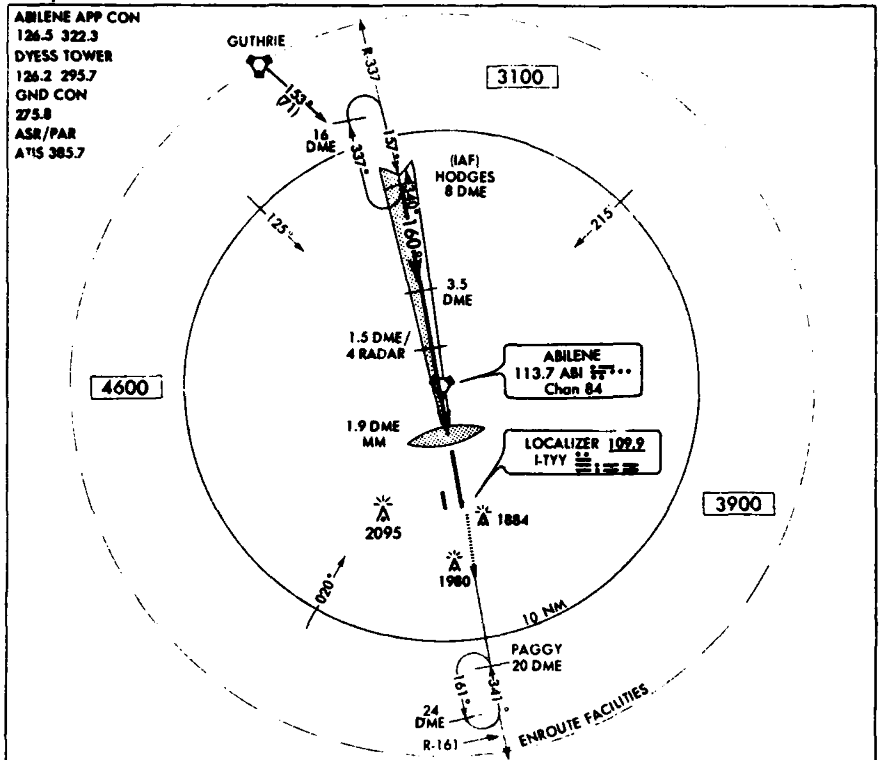
DATE: February 1980

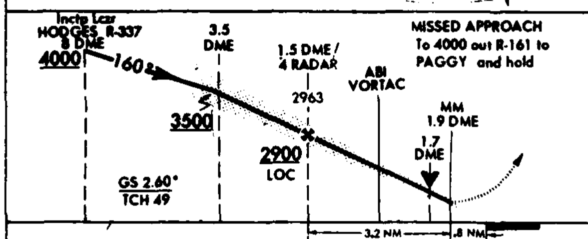
ILS/DME RWY 16

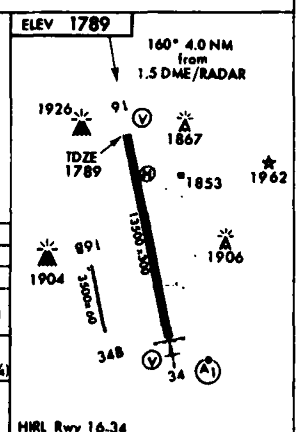
87

AL-2 (USAF)

DYESS AFB
ABILENE, TEXAS







CATEGORY	A	B	C	D	E
S-ILS 16	2010/50 221 (300-1)				
S-LOC 16	2180/50 391 (400-1)			2180-1½ 391 (400-1½)	
CIRCLING	2280-1 491 (500-1)		2280-1½ 491 (500-1½)	2340-2 551 (600-2)	2400-2¼ 611 (700-2¼)

FAF to MAP 3.2 NM

Knots	60	90	120	150	180
Min:Sec	3:12	2:08	1:36	1:17	1:04

ILS/DME RWY 16

32°26'N-99°51'W

87

ABILENE, TEXAS
DYESS AFB

REMARKS

TITLE:

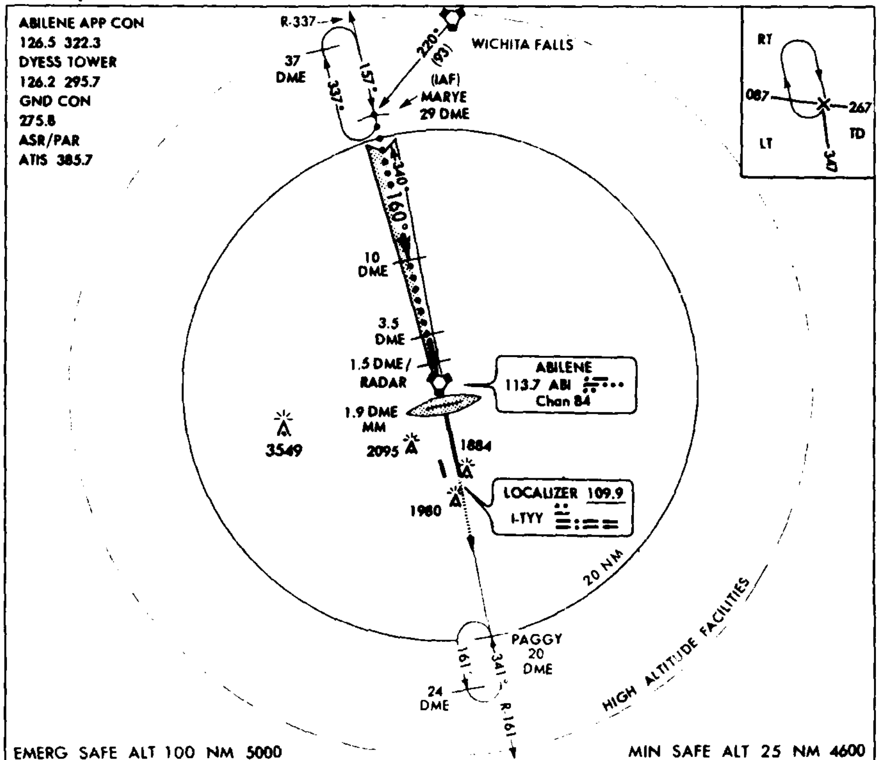
INSTRUMENT APPROACH PROCEDURE

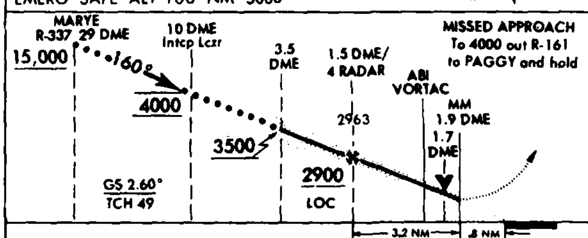
LOCATION	DATE
Dyess AFB	February 1980

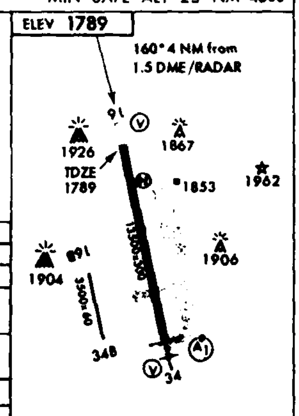
HI-ILS/DME RWY 16

52
JAL-2 (USAF)

DYESS AFB
ABILENE, TEXAS







CATEGORY	C	D	E
S-ILS 16	2010/50 221 (300-1)		
S-LOC 16	2180/50 391 (400-1)	2180-1½ 391 (400-1½)	
CIRCLING	2280-1½ 491 (500-1½)	2340-2 551 (600-2)	2400-2¼ 611 (700-2¼)
S-PAR 16	1889/24 100 (100-½) GS 2.5°		

FAF to MAP 3.2 NM

Knots	120	140	160	180	200
Min:Sec	1:36	1:22	1:12	1:04	0:58

HI-ILS/DME RWY 16 32°26'N-99°51'W ABILENE, TEXAS DYESS AFB

REMARKS

TITLE

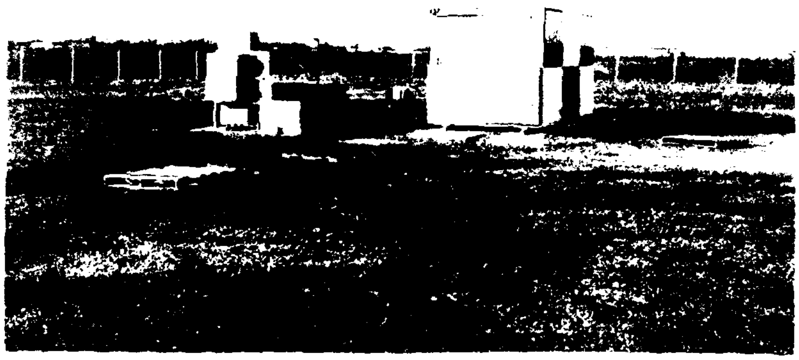
SITE PHOTOGRAPHS

LOCATION

Dyess AFB

DATE

February 1980



View toward west

View toward west

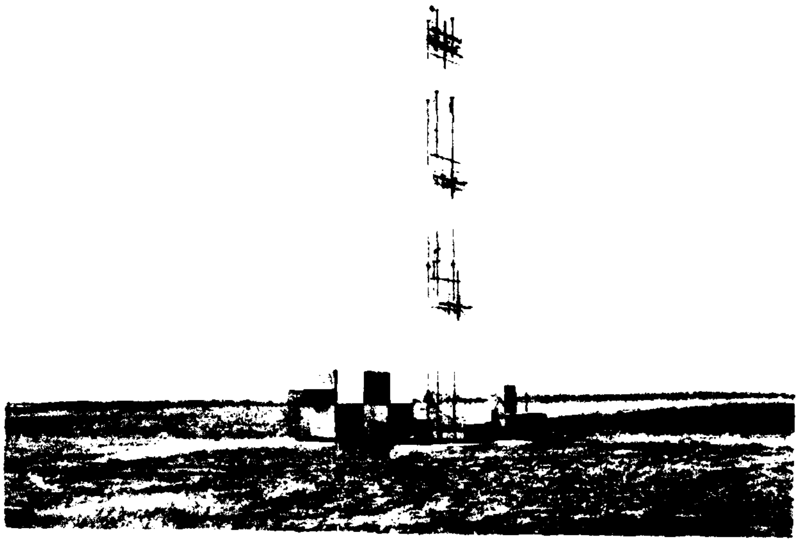
REMARKS

LOCALIZER

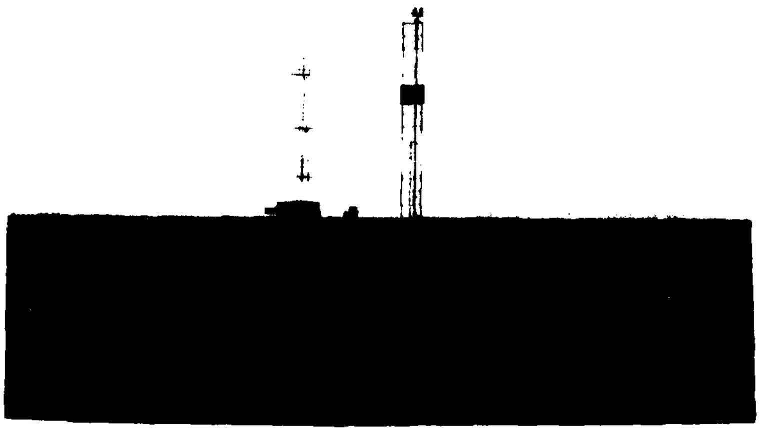
TITLE:

SITE PHOTOGRAPHS

LOCATION	DATE
Dyess AFB	February 1980



View toward west

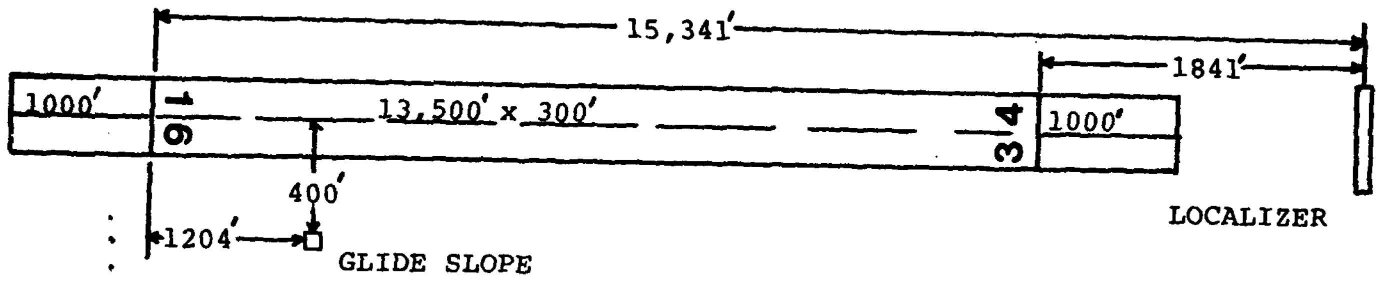


View toward south

REMARKS

GLIDE SLOPE

RUNWAY DATA		DATE 15 March 1980
LOCATION Dyess AFB	RUNWAY 16	SCALE Not to scale



ELEVATIONS

GLIDE SLOPE	1782.6 FT	MSL
END OF R/W 34	1786.5 FT	MSL
END OF R/W 16	1789.1 FT	MSL
R/W ABEAM G/S	1786.7 FT	MSL
LOCALIZER	1790.9 FT	MSL

FACILITY DATA

I. AIRPORT

1. AIRPORT (City or AFB, State or Country)	2. ICAO IDENT	3. MAG VARIATION	4. AIRPORT REFERENCE POINT (Degrees, Minutes, Seconds-to nearest hundredth)
DYESS AFB, TEXAS	KDYS	8° 57.21E 15 April 78	LATITUDE N32° 25' 52.3" LONGITUDE W99° 50' 57.4"
5. OPERATING AGENCY	**6. OWNER**	**7. FIELD ELEVATION (MSL)**	
1993 COMMUNICATIONS SQ DYESS AFB, TEXAS 79607	USAF	1789	

II. GENERAL

8. TYPE FACILITY	9. FREQ/CHANNEL	10. IDENTIFICATION	11. CLASS/CATEGORY	12. COMMON SYSTEM	13. DATE COMMISSIONED
LOCALIZER	109.9 MHZ	I-TYY	CAT I	☐ YES ☒ NO	21 Feb 79
14. EQUIPMENT TYPE	**15. TYPE ANTENNA**	**16. SITE ELEVATION (MSL)**	**17. ANTENNA HEIGHT FT (AG)**	**18. CONTROL STATION AND FREQUENCY**	
AN/GRN-30	OE271G log periodic	1789.91	7'	DYESS TOWER 295.7 MHz	
19. ANTENNA LOCATION (Degrees, Minutes, Seconds—to nearest hundredth)	**20. PRIMARY POWER**	**21. STANDBY POWER**	**22. STANDBY EQUIP**	**23. MONITOR**	
LATITUDE N32° 23' 50.72" LONGITUDE W99° 50' 55.90"	☒ COMMERCIAL ☐ ENGINE	☒ ENGINE ☐ COMMERCIAL ☐ NONE	☒ YES ☐ NO	☒ YES ☐ NO ☐ SINGLE ☒ DUAL	
24. RUNWAY NUMBER	**25. ILS/PAR RUNWAY TRUE BEARING**	**26. MAG VARIATION**	**27. VOICE**	**28. MONITOR RADIAL**	**29. POWER OUTPUT**
16	168.83°	N/A	N/A	N/A	15 W
30. RUNWAY DIMENSIONS		**31. DISPLACED THRESHOLD**	**32. COMMISSIONED**	**33. ASR VERTICAL COVERAGE RADIAL AND OPERATIONAL REQUIREMENT**	
LENGTH 13500 FEET WIDTH 300 FEET		☐ YES ☒ NO	WIDTH 3.00 ° ANGLE ___ °	RADIAL ___ DISTANCE ___ ALTITUDE ___ N/A	
34. THRESHOLD ELEVATION (MSL)	**35. TCH FT (AG)**	**36. ILS/PAR/VASI ANGLE COINCIDENCE** ILS (°)	PAR (°)	VASI (°)	**37. RESTRICTED**
1789.1	* 52.26	2.6	2.5	2.5	☐ YES ☒ NO

III. LOCALIZER AND SDF DATA

38. DISTANCE TO O.M.	39. DISTANCE TO M.M.	40. DISTANCE TO C/L RUNWAY ABEAM GLIDE PATH ANTENNA (Feet)	41. DIRECTION (Right or Left) AND DISTANCE LOC OFFSET FROM RUNWAY C/L	
(NM) 6.52 (FEET) 39349.4	(NM) 3.07 (FEET) 18691	14134.5	CENTERED ON EXTENDED RWY CENTERLINE	
42. DISTANCE TO THRESHOLD	**43. DISTANCE TO STOP END RWY**	**44. USABLE DISTANCE**	**45. OFFSET LOC TRUE BEARING**	**46. LOC CW MONITOR**
15341	1841	18 NM AT 6300 FT (MSL/MAA) 18 NM AT 4000 FT (MSL/MRA)	N/A	WIDE 3.51 NARROW 2.49
47. LOCALIZER COURSE TAILORED		**48. BACK COURSE USABLE DISTANCE**	**49. BACK COURSE TRUE BEARING**	**50. OMKR WIDTH (Feet)**
☒ YES ☐ NO WIDTH AT THRESHOLD (Feet) 700'		N/A NM AT ___ FT (MSL/MAA) N/A NM AT ___ FT (MSL/MRA)	N/A	N/A
51. MMKR WIDTH (Feet)	**52. IMKR WIDTH (Feet)**	**53. FRONT COURSE CHECK POINT**	**54 BACK COURSE CHECK POINT**	
	N/A	E.W. Paved short roat at 6.3DME North of ABI VORTAC	N/A	

IV. GLIDE PATH DATA (ILS/PAR/VASI)

55 DISTANCE TO O.M.	56 DISTANCE TO M.M.	57 DISTANCE TO I.M.	58 DISTANCE TO POINT "C"	59 DISTANCE TO THRESHOLD (Feet)	60 RUNWAY ELEV ABEAM G/S ANT (MSL)
(NM) ___ (Feet) ___	(NM) ___ (Feet) ___	(NM) ___ (Feet) ___	(NM) ___ (Feet) ___	(NM) ___ (Feet) ___	
61 DIRECTION (right or left) AND DISTANCE FROM ANTENNA TO RUNWAY C/L		**62 ELEVATION TD ZONE (MSL)**	**63 DISTANCE - THRESHOLD TO GPI** ILS (Feet)	PAR (Feet)	VASI (Feet)

64 ALTITUDE OVER O.M. OR CK. PT. (Feet)			65 ALTITUDE OVER M.M.			66 ALTITUDE OVER I.M.	
TAPELINE	E.C	MSL	TAPELINE	E.C.	MSL	TAPELINE	MSL

67 DISTANCE O.M. TO THRESHOLD (Feet)	68 DISTANCE M.M. TO THRESHOLD (Feet)	69 TYPE APPROACH LIGHTING	70 TYPE RUNWAY LIGHTING	71 GLIDE PATH MONITOR
				ANGLE (High) ___ ANGLE (Low) ___

V. VOR/VORTAC/TACAN/DME/NDB	
72 REFERENCE RADIAL ____ ° / CHECK POINT DESCRIPTION	73 THEODOLITE POSITION

74 GROUND RECEIVER CHECK POINTS			75 THEODOLITE REFERENCE POINTS	
RADIAL	DISTANCE	DESCRIPTION	BEARING	DESCRIPTION

76 FIXES AND RECEIVER CHECK POINTS					77 IFR RADIAL DATA		
NAME	RADIAL	DISTANCE	ALTITUDE	DESCRIPTION	RADIAL	RADIAL USE	AIRPORT

VI. AIR TRAFFIC CONTROL SYSTEM *(ASR-ARSR-CENTER-PAR-TOWER-VHF-DF-UHF-DF-STATION)*

78 TYPE SECONDARY	79 MTI BLIND SPEED	80 VIDEO MAPPING	81 ANT TILT *(Degrees)*	82 FREQUENCIES
NA	NA	☐ YES NA ☐ NO	FIXED NA VAR. NA	

83 NON-PRECISION APPROACHES		84 FIXES AND ROUTES					
AIRPORT	RUNWAY	ROUTE	BEARING	FROM/TO	FACILITY	DISTANCE	ALTITUDE

REMARKS *(Include all facility or airspace restrictions.)*

RWY 16 Apch end N32° 26' 19.64" W99° 51' 30.56" 1789.1' MSL

RWY 16 Stop end N32° 24' 08.59" W99° 51' 00.06" 1786.5' MSL

Middle Marker N32° 26' 54.19" W99° 51' 38.57" 1790.79'MSL

Middle Marker antenna is 10.1' high, Single Yagi, AS3230G
75 MHZ, 2.5 W

* ~~TRACALS~~ Recommended Changes.

CIVIL ENGINEERING VERIFICATION (SIGNATURE)

OWNING UNIT	AREA	FACILITY IDENT	FACILITY TYPE
1993 COMM SQ	SACCA	I-TYY	LOCALIZER

DATE PREPARED	TYPED NAME AND GRADE	SIGNATURE

☆U.S. GPO: 1976-665-660/624 Region 6

FACILITY DATA

I. AIRPORT

1. AIRPORT *(City or AFB, State or Country)*: DYESS AFB, TEXAS
2. ICAO IDENT: KDYS
3. MAG VARIATION: 8° 57.21E 15 April 78
4. AIRPORT REFERENCE POINT *(Degrees, Minutes, Seconds-to nearest hundredth)*: LATITUDE N32° 25' 52.3" LONGITUDE W99° 50' 57.4
5. OPERATING AGENCY: 1993 COMMUNICATIONS SQ DYESS AFB, TEXAS 79607
6. OWNER: USAF
7. FIELD ELEVATION (MSL): 1789

II. GENERAL

8. TYPE FACILITY: GLIDE SLOPE
9. FREQ/CHANNEL: 333.8 MHZ
10. IDENTIFICATION: I-TYY
11. CLASS/CATEGORY: CAT I
12. COMMON SYSTEM: ☐ YES ☒ NO
13. DATE COMMISSIONED: 25 May 79
14. EQUIPMENT TYPE: AN/GRN-31
15. TYPE ANTENNA: AS 3229G Capture effect
16. SITE ELEVATION *(MSL)*: 1782.85
17. ANTENNA HEIGHT FT *(AG)*: * 49.75
18. CONTROL STATION AND FREQUENCY: DYESS TOWER 295.7 MHz
19. ANTENNA LOCATION *(Degrees, Minutes, Seconds—to nearest hundredth)*: LATITUDE N32° 26' 07.17" LONGITUDE W99° 51' 32.41"
20. PRIMARY POWER: ☒ COMMERCIAL ☐ ENGINE
21. STANDBY POWER: ☒ ENGINE ☐ COMMERCIAL ☐ NONE
22. STANDBY EQUIP: ☒ YES ☐ NO
23. MONITOR: ☒ YES ☐ NO ☐ SINGLE ☒ DUAL
24. RUNWAY NUMBER: 16
25. ILS/PAR RUNWAY TRUE BEARING: 168.83
26. MAG VARIATION: N/A
27. VOICE: N/A
28. MONITOR RADIAL: N/A
29. POWER OUTPUT: 3.0 W
30. RUNWAY DIMENSIONS: LENGTH 13500 FEET WIDTH 300 FEET
31. DISPLACED THRESHOLD: ☐ YES ☒ NO
32. COMMISSIONED: WIDTH ____° ANGLE 2.6°
33. ASR VERTICAL COVERAGE RADIAL AND OPERATIONAL REQUIREMENT: RADIAL ____ DISTANCE ____ ALTITUDE ____
34. THRESHOLD ELEVATION *(MSL)*: 1789.1
35. TCH FT *(AG)*: *52.26
36. ILS/PAR/VASI ANGLE COINCIDENCE: ILS (°) 2.6 PAR (°) 2.5 VASI (°) 2.5
37. RESTRICTED: ☒ YES ☐ NO

III. LOCALIZER AND SDF DATA

38. DISTANCE TO O.M. (NM) (FEET)
39. DISTANCE TO M.M. (NM) (FEET)
40. DISTANCE TO C/L RUNWAY ABEAM GLIDE PATH ANTENNA *(Feet)*
41. DIRECTION *(Right or Left)* AND DISTANCE LOC OFFSET FROM RUNWAY C/L
42. DISTANCE TO THRESHOLD
43. DISTANCE TO STOP END RWY
44. USABLE DISTANCE ____ NM AT ____ FT *(MSL/MAA)* ____ NM AT ____ FT *(MSL/MRA)*
45. OFFSET LOC TRUE BEARING
46. LOC CW MONITOR: WIDE NARROW
47. LOCALIZER COURSE TAILORED: ☐ YES ☐ NO WIDTH AT THRESHOLD *(Feet)*
48. BACK COURSE USABLE DISTANCE ____ NM AT ____ FT *(MSL/MAA)* ____ NM AT ____ FT *(MSL/MRA)*
49. BACK COURSE TRUE BEARING
50. OMKR WIDTH *(Feet)*
51. MMKR WIDTH *(Feet)*
52. IMKR WIDTH *(Feet)*
53. FRONT COURSE CHECK POINT
54. BACK COURSE CHECK POINT

IV. GLIDE PATH DATA *(ILS/PAR/VASI)*

55. DISTANCE TO ~~O.M.~~ FAF: (NM) 4.198 (Feet) 25510.5
56. DISTANCE TO M.M.: (NM) .7499 (Feet) 4556.5
57. DISTANCE TO I.M.: (NM) N/A (Feet) N/A
58. DISTANCE TO POINT "C": (NM) .3851 (Feet) 2339.8
59. DISTANCE TO THRESHOLD *(Feet)*: * (NM) .1982 (Feet) 1204
60. RUNWAY ELEV ABEAM G/S ANT *(MSL)*: 1786.69
61. DIRECTION *(right or left)* AND DISTANCE FROM ANTENNA TO RUNWAY C/L: 400' RIGHT
62. ELEVATION TD ZONE (MSL): 1789.1
63. DISTANCE - THRESHOLD TO GPI: ILS *(Feet)* * GPI 1151.1 RPI 1109.5; PAR *(Feet)* GPI 1076 RPI 1110; VASI *(Feet)* RPI 1095.74
64. ALTITUDE OVER O.M. OR CK. PT. *(Feet)*: TAPELINE ____ E.C FAF MSL ____
65. ALTITUDE OVER M.M.: TAPELINE 206.91 E.C. .496 MSL 1994.1
66. ALTITUDE OVER I.M.: TAPELINE ____ MSL ____
67. DISTANCE O.M. TO THRESHOLD *(Feet)*
68. DISTANCE M.M. TO THRESHOLD *(Feet)*: 3350'
69. TYPE APPROACH LIGHTING: NO LIGHTS
70. TYPE RUNWAY LIGHTING: HIRL
71. GLIDE PATH MONITOR: ANGLE *(High)* 2.80° ANGLE *(Low)* 2.41°

V. VOR/VORTAC/TACAN/DME/NDB

72 REFERENCE RADIAL ____ ° / CHECK POINT DESCRIPTION	73 THEODOLITE POSITION

74 GROUND RECEIVER CHECK POINTS

RADIAL	DISTANCE	DESCRIPTION

75 THEODOLITE REFERENCE POINTS

BEARING	DESCRIPTION

76 FIXES AND RECEIVER CHECK POINTS

NAME	RADIAL	DISTANCE	ALTITUDE	DESCRIPTION

77 IFR RADIAL DATA

RADIAL	RADIAL USE	AIRPORT

VI. AIR TRAFFIC CONTROL SYSTEM *(ASR-ARSR-CENTER-PAR-TOWER-VHF-DF-UHF-DF-STATION)*

78 TYPE SECONDARY	79 MTI BLIND SPEED	80 VIDEO MAPPING	81 ANT TILT *(Degrees)*
		☐ YES ☐ NO	FIXED ____ VAR. ____

82 FREQUENCIES

83 NON-PRECISION APPROACHES

AIRPORT	RUNWAY

84 FIXES AND ROUTES

ROUTE	BEARING	FROM/TO	FACILITY	DISTANCE	ALTITUDE

REMARKS *(Include all facility or airspace restrictions.)*

Block 16 used for TCH, Point C, MM alt

Glide slope unuseable below 2010' MSL due to structure.
(Reference FAA Commissioning Flight Check Report 22, 24,25 May 79)

Glide slope monitor mast is 209' 9.5" North of glide slope mast.

* TRACLAS RECOMMENDED CHANGES. AFM 55-9, Figure 129A, used for Calculation of TCH,RPI and GPI.

CIVIL ENGINEERING VERIFICATION (SIGNATURE)

OWNING UNIT	AREA	FACILITY IDENT	FACILITY TYPE
1993 COMM SQ	SACCA	I-TYY	GLIDE SLOPE

DATE PREPARED	TYPED NAME AND GRADE	SIGNATURE

☆U.S. GPO: 1976-665-660/624 Region 6

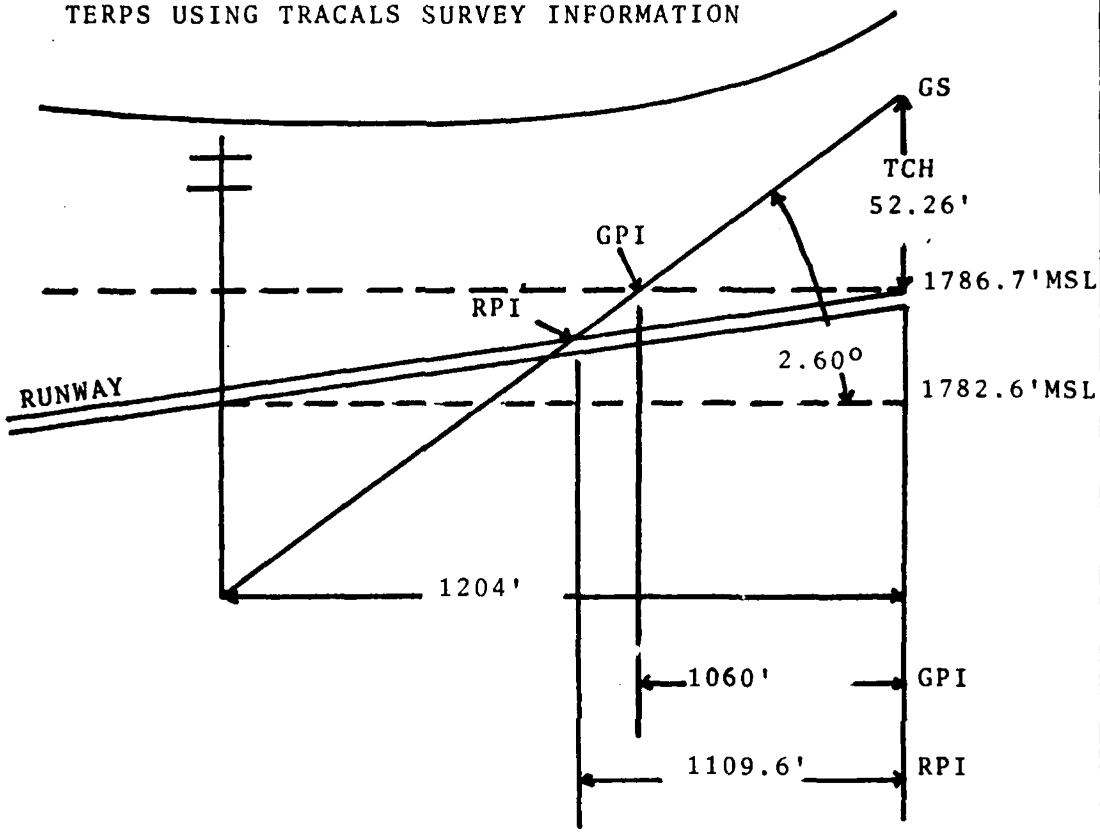
TITLE:

FACILITY DATA

LOCATION: Dyess AFB

DATE: February 1980

TERPS USING TRACALS SURVEY INFORMATION



TCH = (TAN GS) (DIST ANT TO TH) - (TH ELEV - ANT ELEV)

GPI = TCH ÷ TAN GS

$$\text{RPI} = \frac{(\text{TCH})\ (\text{DIST ANT FROM TH})}{\text{TCH} + (\text{RWY CROWN ELEV ABEAM ANT} - \text{ANT ELEV})}$$

TERPS USING FACILITY DATA SHEET INFORMATION

TCH= 52.26'

GPI= 1151.1'

RPI= 1109.5'

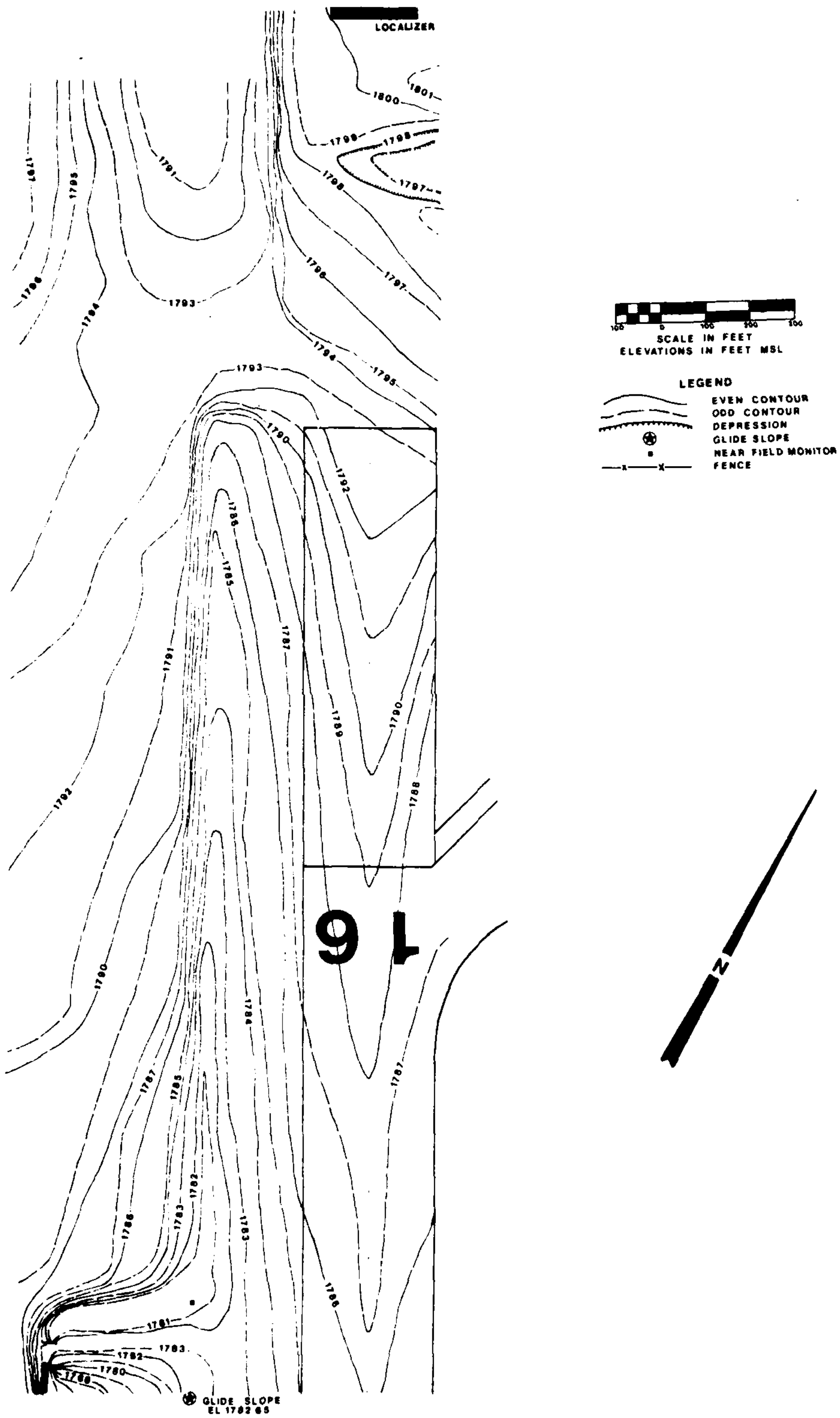
REMARKS

TITLE:

GLIDE SLOPE CONTOUR STUDY RUNWAY 16

LOCATION: Dyess AFB

DATE: 15 March 1980

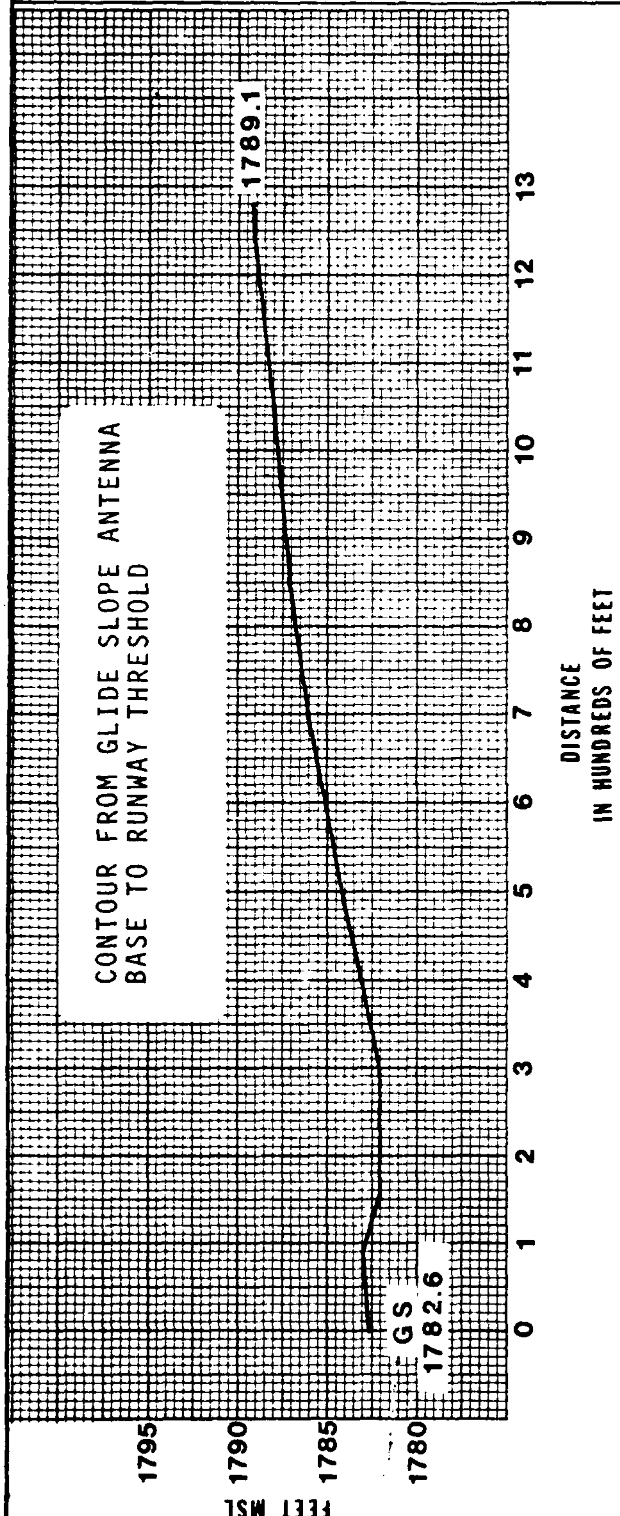


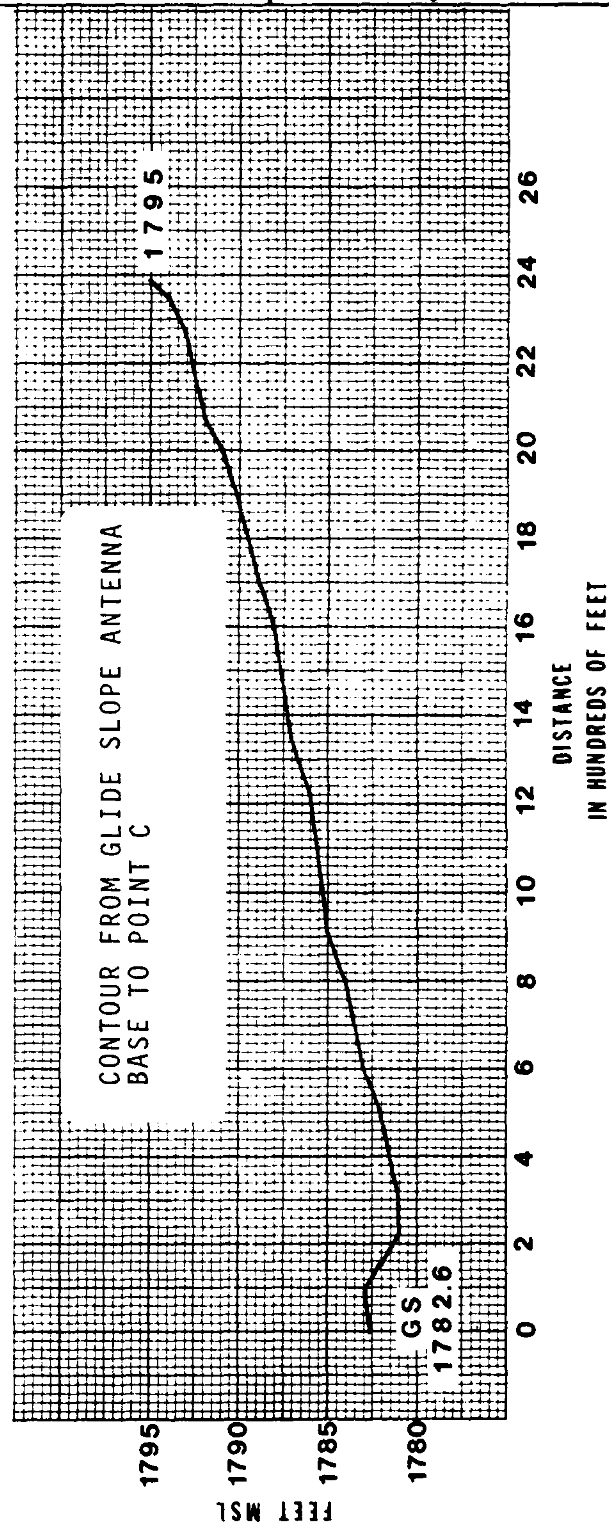
TITLE:

GLIDE SLOPE CONTOUR STUDY RUNWAY 16

LOCATION: Dyess AFB

DATE: February 1980





TITLE

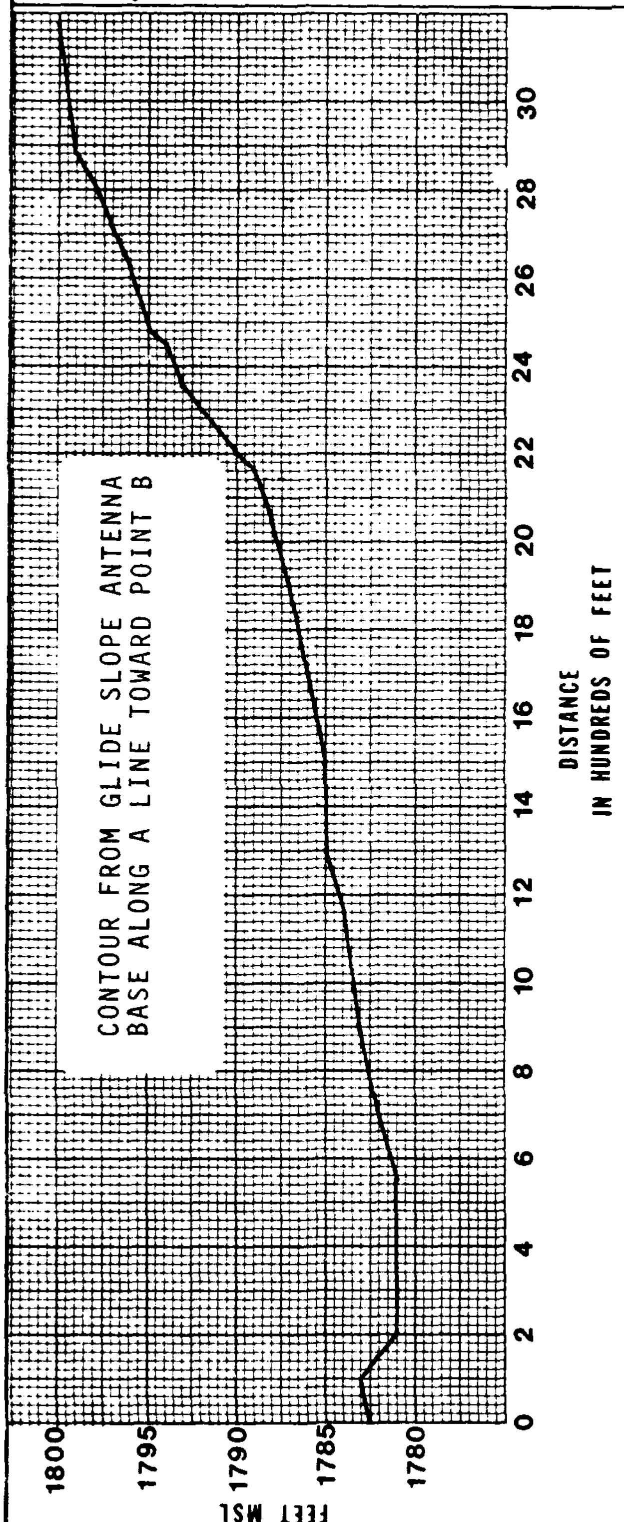
GLIDE SLOPE CONTOUR STUDY RUNWAY 16

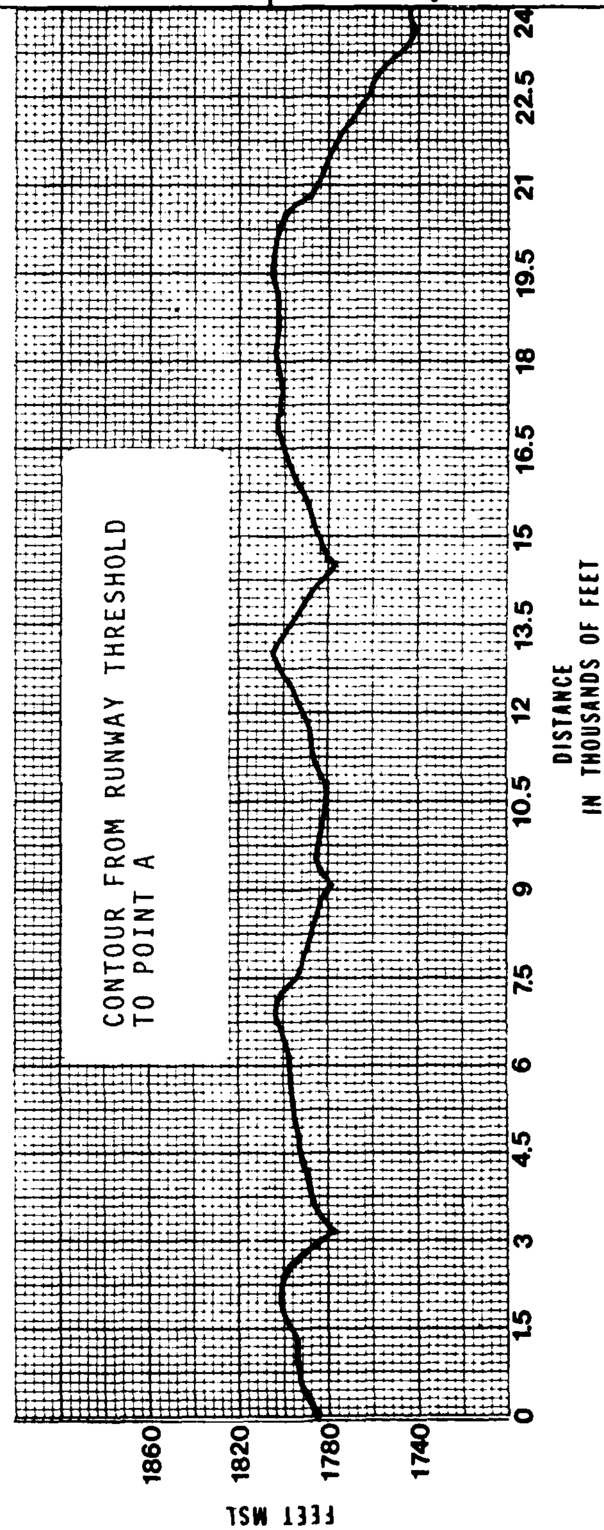
LOCATION

Dyess AFB

DATE

February 1980

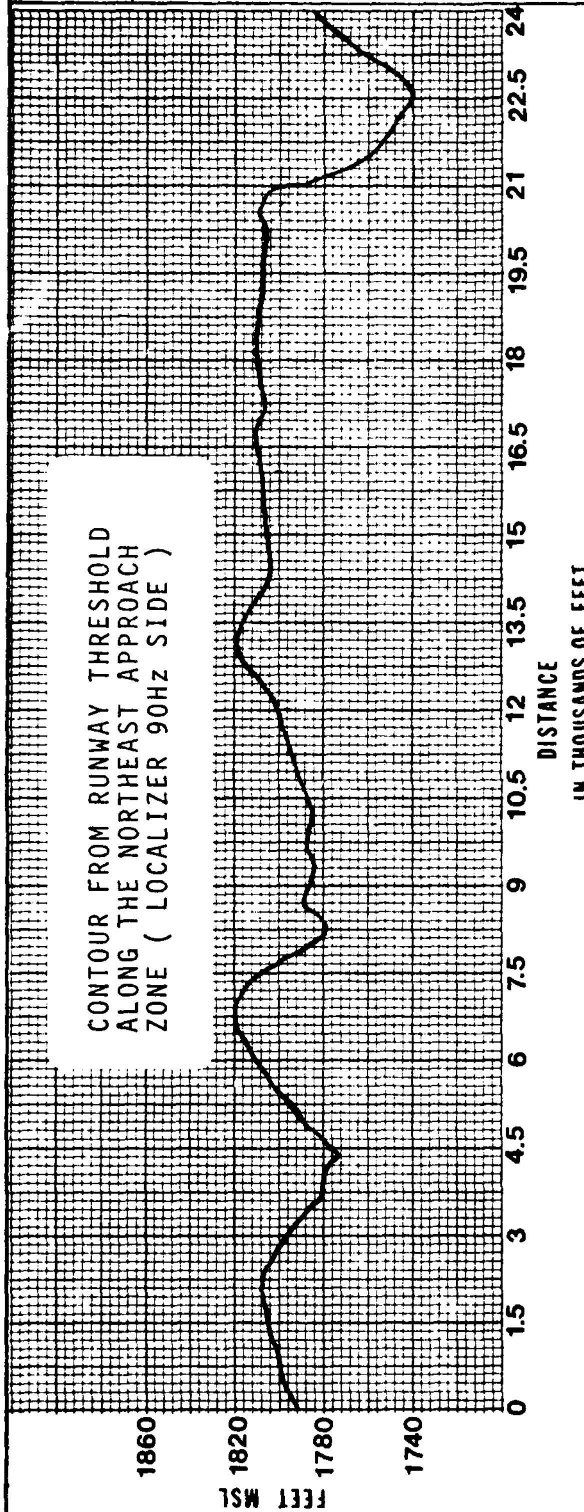


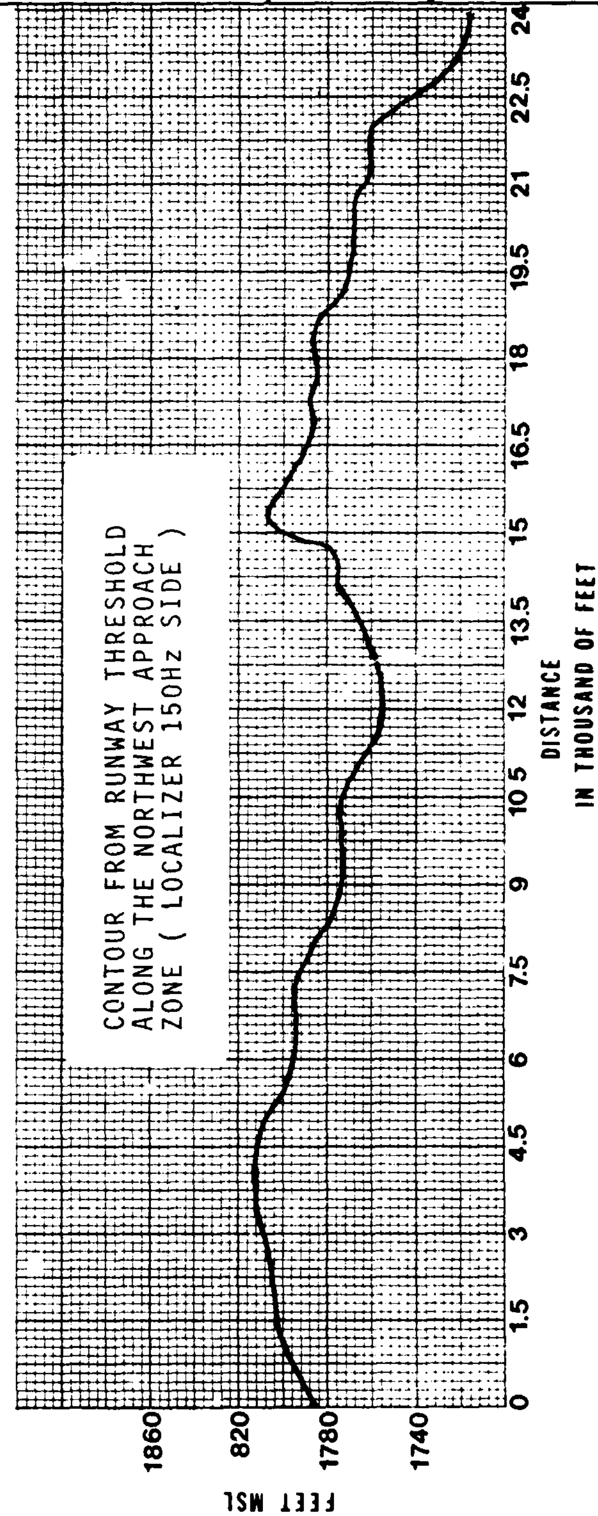


TITLE:

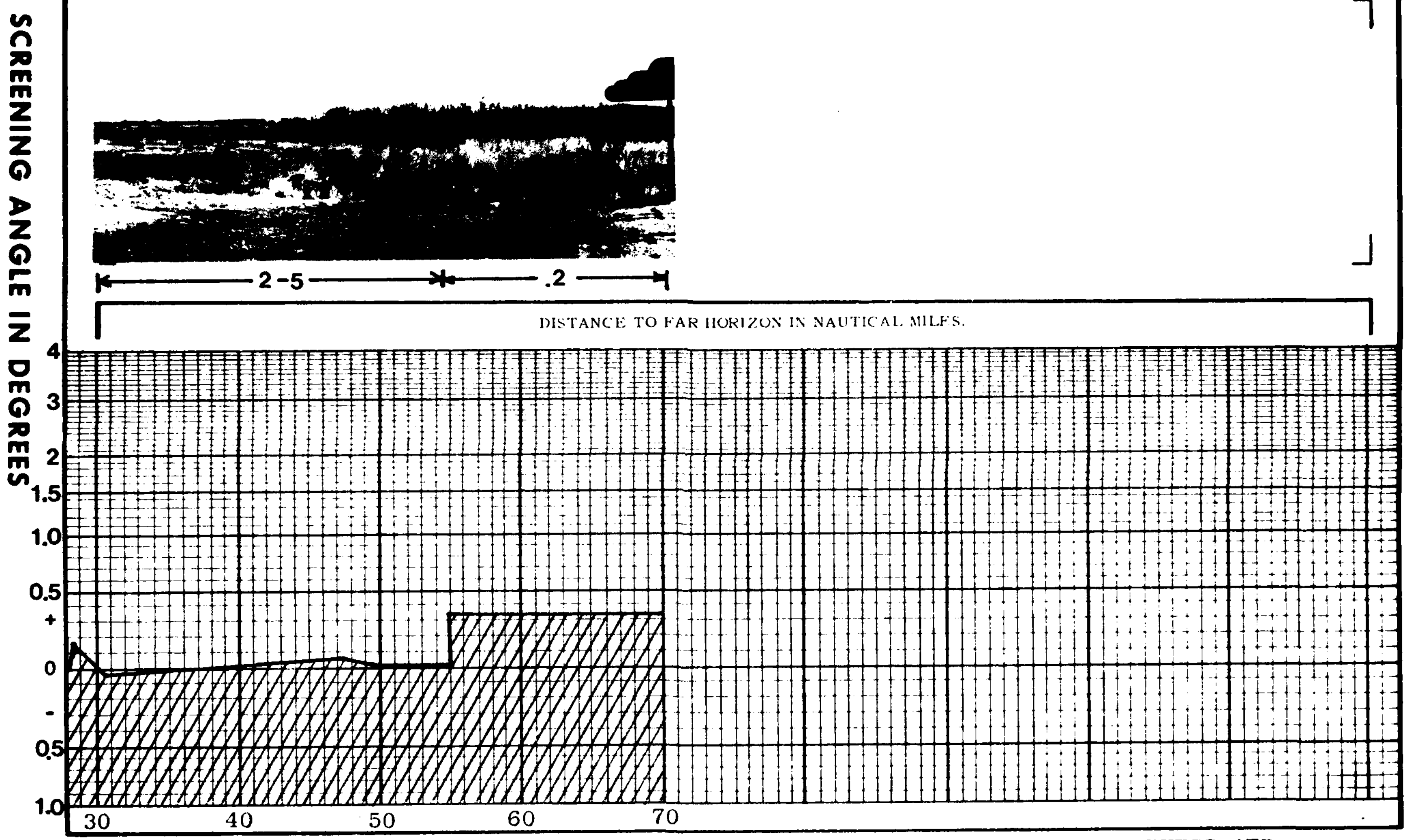
GLIDE SLOPE CONTOUR STUDY RUNWAY 16

LOCATION	DATE
Dyess AFB	February 1980





SKYLINE GRAPH

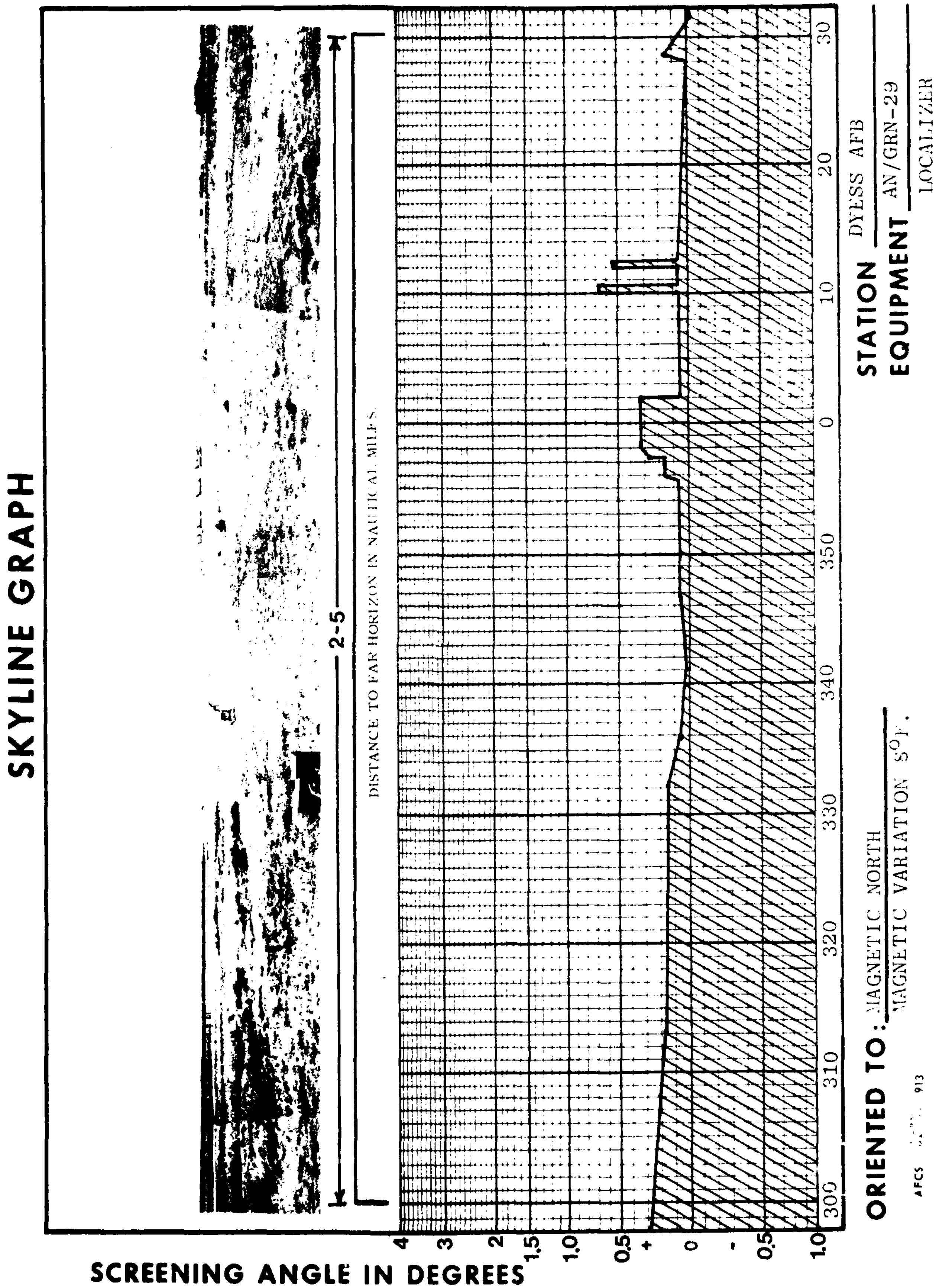


ORIENTED TO: MAGNETIC NORTH
MAGNETIC VARIATION 8°E.

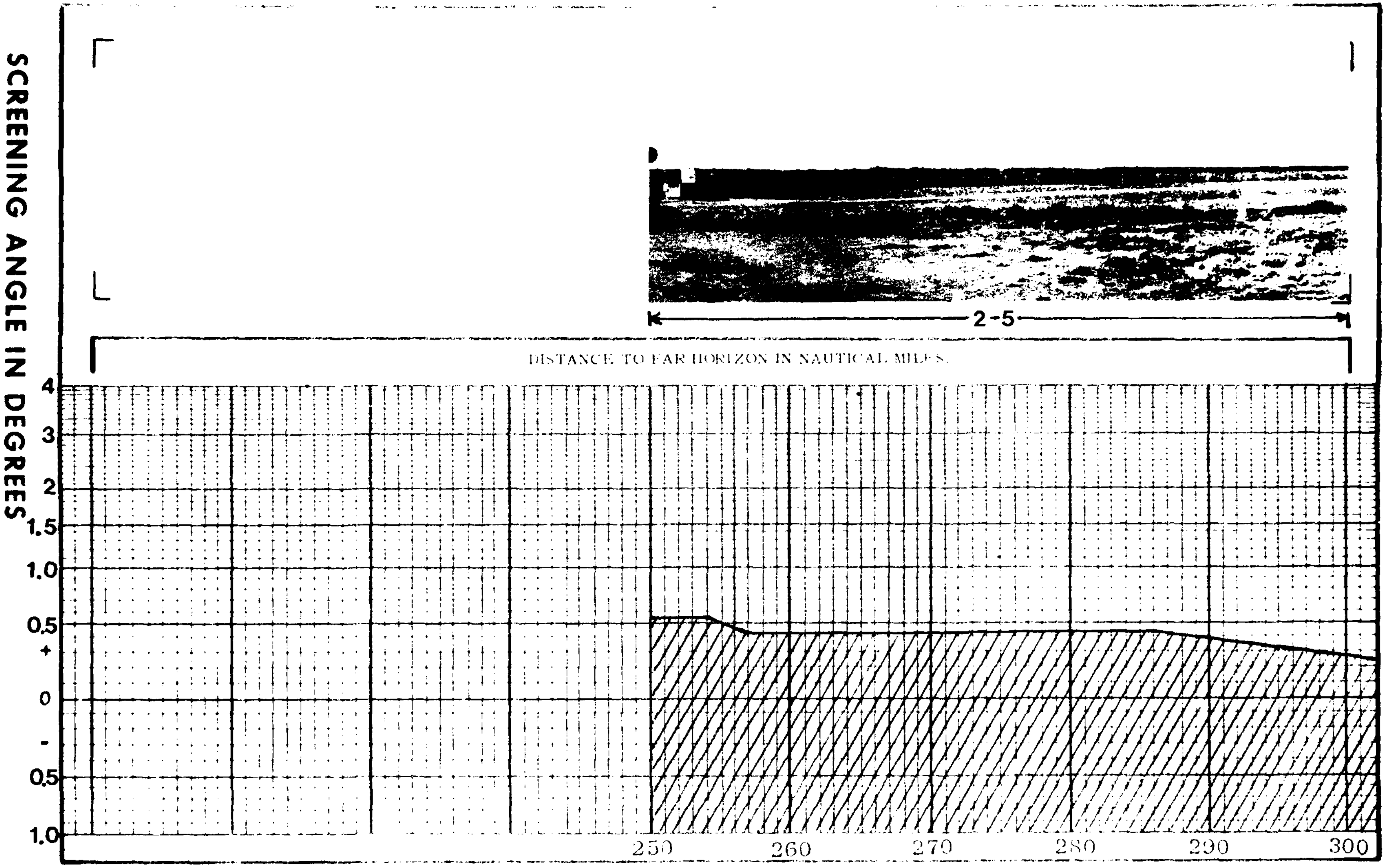
STATION DYESS AFB

EQUIPMENT AN/GRN-29
LOCALIZER

AFCS 913


SKYLINE GRAPH
2-5
DISTANCE TO FAR HORIZON IN NAUTICAL MILES
300
310
320
330
340
350
0
10
20
30
SCREENING ANGLE IN DEGREES
4
3
2
1.5
1.0
0.5
+
0
-
0.5
1.0
STATION DYESS AFB
EQUIPMENT AN/GRN-29
LOCALIZER
ORIENTED TO: MAGNETIC NORTH
MAGNETIC VARIATION 8°E.
AFCS 913

SKYLINE GRAPH



ORIENTED TO: MAGNETIC NORTH

MAGNETIC VARIATION 8°E.

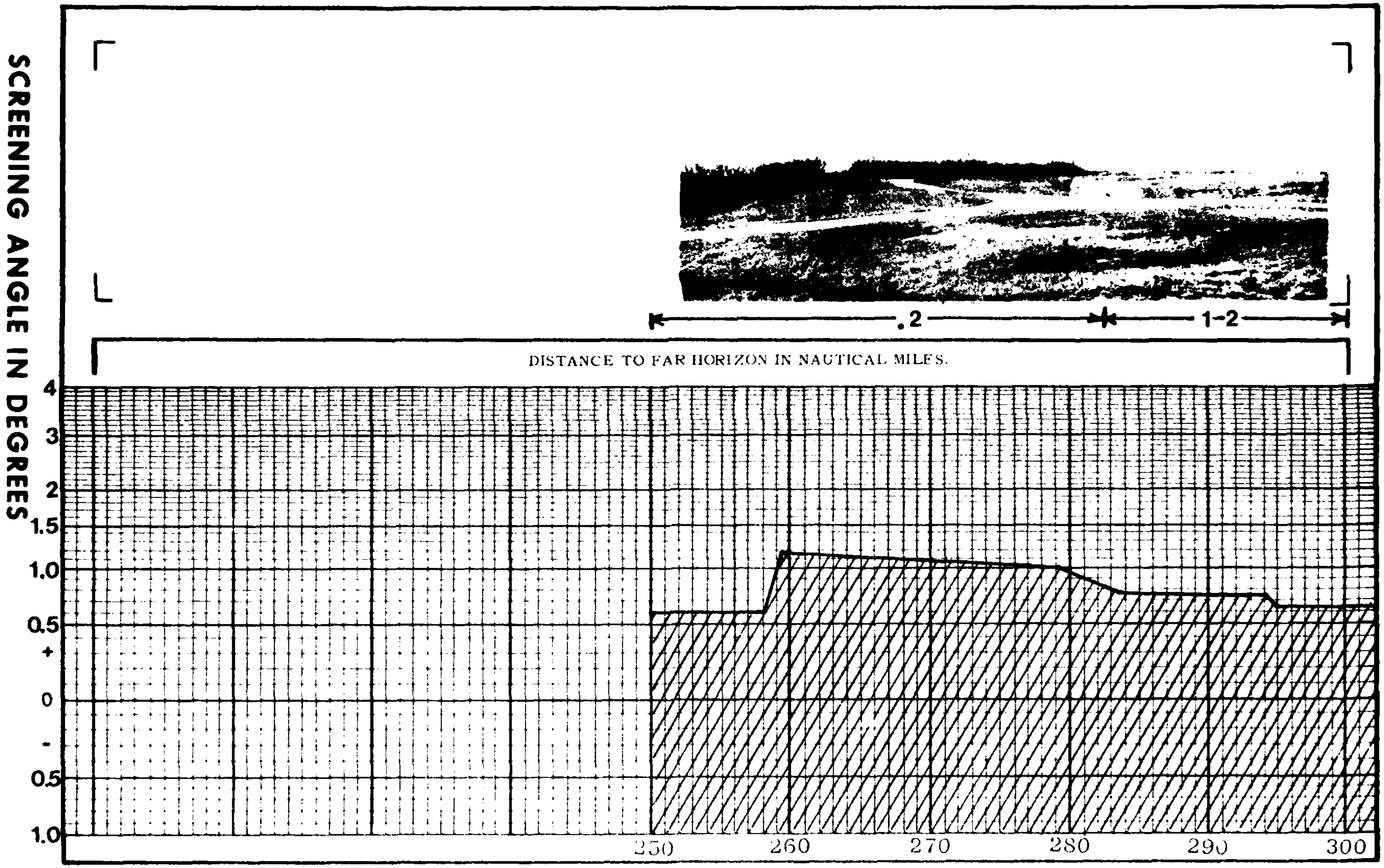
AFCS ... 913

STATION DYESS AFB

EQUIPMENT AN/GRN-29

LOCALIZER

SKYLINE GRAPH

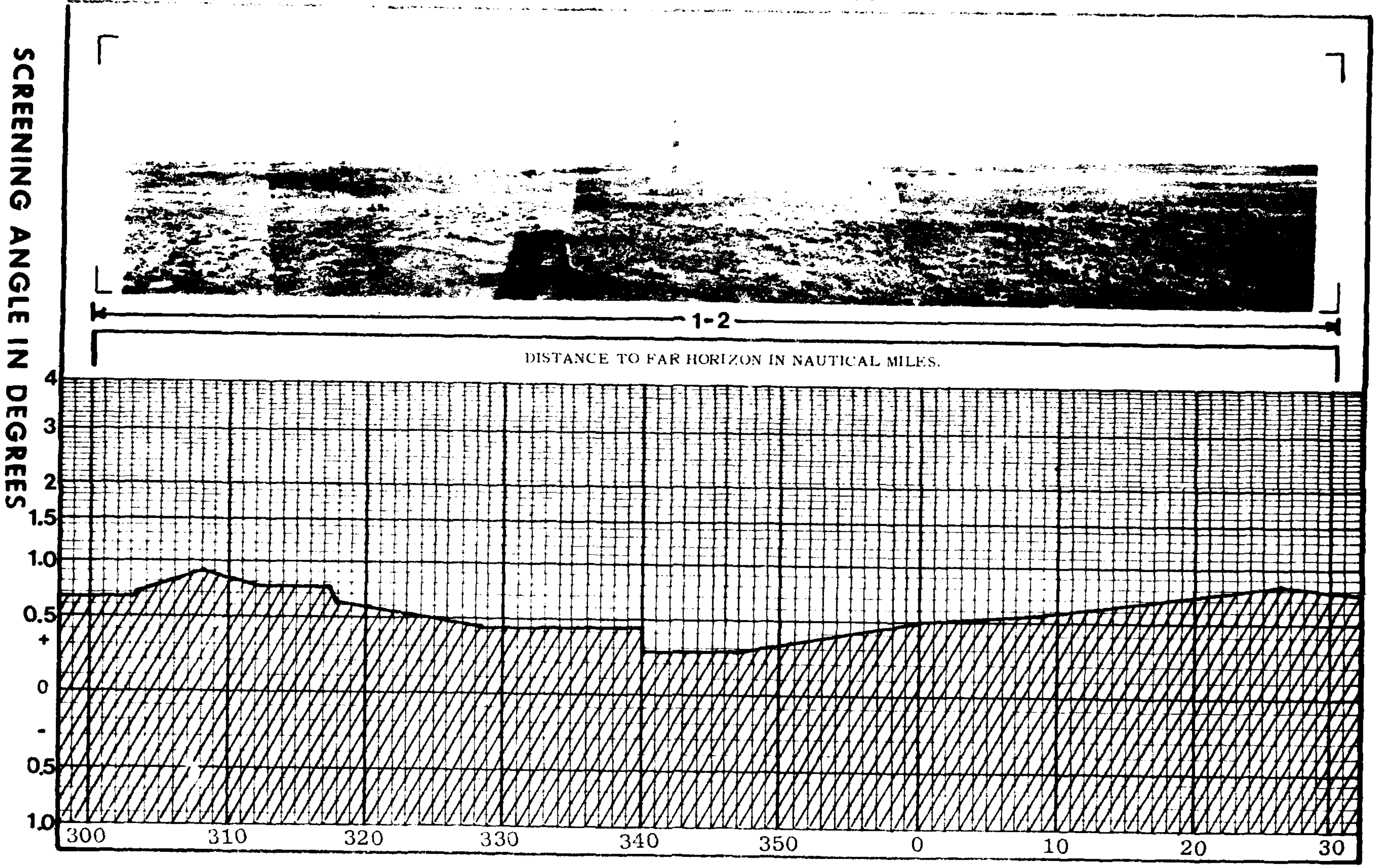


ORIENTED TO: MAGNETIC NORTH
MAGNETIC VARIATION 8°E.

AFCS 913

STATION DYESS AFB
EQUIPMENT AN/GRN-29
GLIDE SLOPE

SKYLINE GRAPH



ORIENTED TO: MAGNETIC NORTH

MAGNETIC VARIATION 8°E.

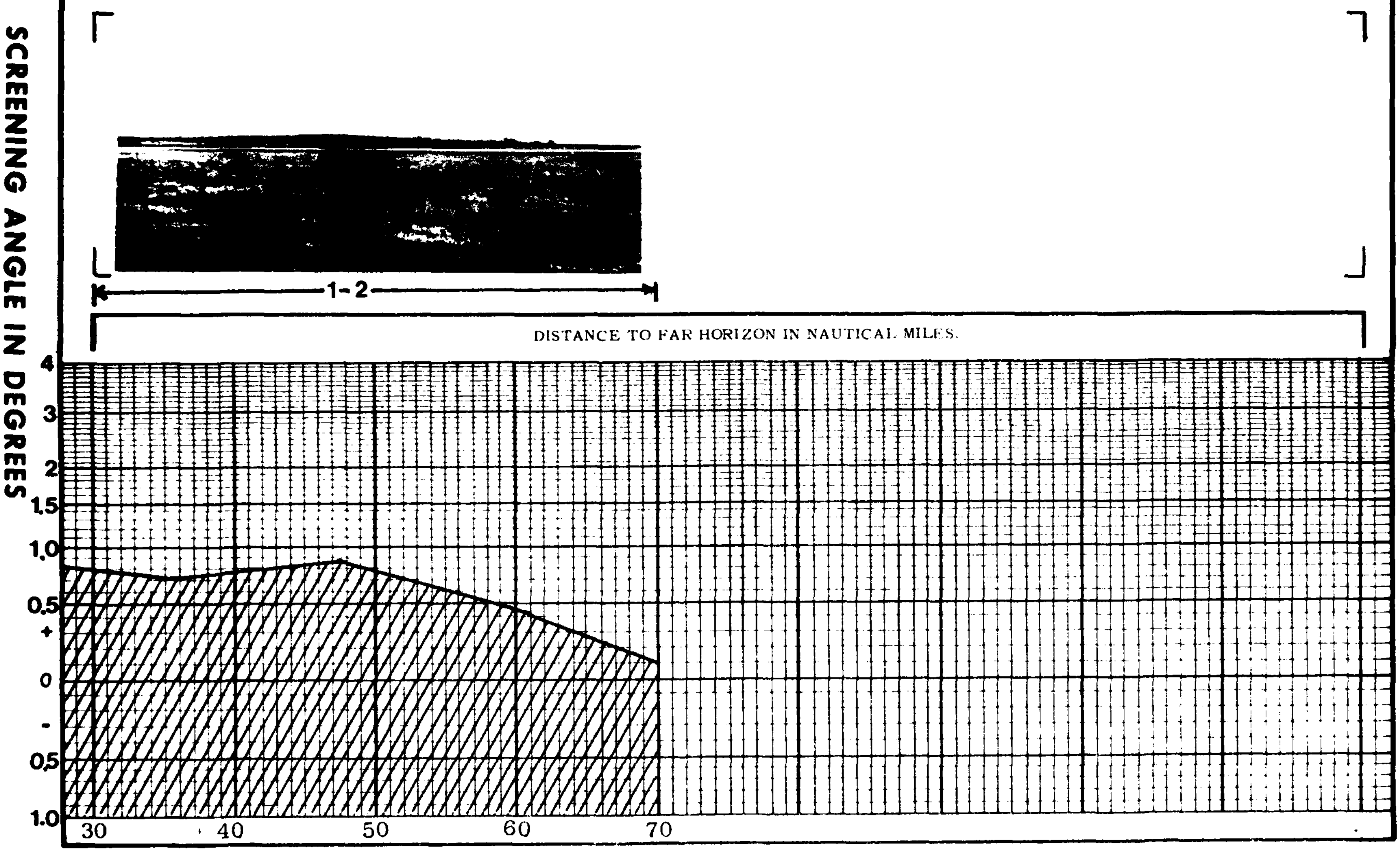
AFCS ... 913

STATION DYESS AFB

EQUIPMENT AN/GRN-29

GLIDE SLOPE

SKYLINE GRAPH



ORIENTED TO: MAGNETIC NORTH

MAGNETIC VARIATION 8°E.

AFCS FORM 913

STATION DYESS AFB

EQUIPMENT AN/GRN-29

GLIDE SLOPE

SSILS LOCALIZER INITIAL PERFORMANCE CHECKLIST		DATE: February 1980
LOCATION: Dyess AFB	EQUIPMENT AND SERIAL NUMBER: AN/GRN-30 770011	TECHNICIAN: TSgt Crist

CHECK	SPECIFICATION	TRANSMITTER NO. 1 INITIAL	TRANSMITTER NO. 1 ADJUSTED	TRANSMITTER NO. 2 INITIAL	TRANSMITTER NO. 2 ADJUSTED	REMARKS
COURSE CARRIER POWER	SAME AS LAST FLIGHT CHECK	14.9 W		14.8 W		
COURSE SIDEBAND POWER	SAME AS LAST FLIGHT CHECK	392mW		395mW		
CLEARANCE CARRIER POWER	SAME AS LAST FLIGHT CHECK	4.5 W		4.5 W		
CLEARANCE SIDEBAND POWER	SAME AS LAST FLIGHT CHECK	175mW		165mW		
COURSE % MODULATION	±4% OF LAST FC	39.1		39.1		
90Hz % MODULATION	±2% OF LAST FC	20.7		20.3		
150Hz % MODULATION	±2% OF LAST FC	20.3		20.3		
CLEARANCE % MOD	±4% OF LAST FC	38.4		40.4		
90Hz % MODULATION	±2% OF LAST FC	20.8		21.2		
150Hz % MODULATION	±2% OF LAST FC	20.7		21.2		
COURSE POWER SUPPLY 1						
Q5 DC OUT	0.75 TO 3.5A	1.4		1.3		
Q4 DC OUT	0.75 TO 3.5A	1.3		1.24		
DC OUT	26.5 TO 29.5 V	28.5		28.5		
PRE REG	30 TO 38V	35.5		35.4		
COURSE POWER SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5A	1.5		1.6		
Q10 DC OUT	0.75 TO 3.5A	1.6		1.64		
DC OUT	26.5 TO 29.5V	28.5		28.5		
PRE REG	30 TO 38V	36		36		
COURSE TRANSMITTER						
OSC TUNE	0.5 MIN	1.45		1.32		
EXCTR OUTPUT	0.85 TO 3.0	1.95		1.85		
CSB PA	1.0 TO 3.25	2.32		2.35		
SBO PA	0.75 TO 1 95	1.25		1.4		
CSB PWR OUT	0.50 TO 2.0	1.4		1.3		
DC IN	2.2 TO 3.5	26.5		26.5		
DC IN	1.0 TO 6.7	4.8		5.1		
SBO PWR OUT	0.5 TO 2.5	1.15		1.0		
CLEARANCE POWER SUPPLY 1						
Q5 DC OUT	0.75 TO 3.5A	1.62		1.65		
Q4 DC OUT	0.75 TO 3.5A	1.5		1.6		
DC OUT	26.5 TO 29.5V	27.5		27.5		
PRE REG	30 TO 38	35		34.5		
CLEARANCE POWER SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5A	1.5		1.6		
Q10 DC OUT	0.75 TO 3.5A	1.6		1.7		
DC OUT	26.5 TO 29.5V	27.5		27.5		
PRE REG	30 TO 38	34.5		34.5		
CLEARANCE TRANSMITTER						
OSC TUNE	0.5 MIN	1.22		1.55		

REMARKS

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
EXCTR OUTPUT	0.85 TO 3.0	1.95		2.15		
CSB PA	1.0 TO 3.25	1.65		1.55		
SBO PA	0.50 TO 2.0	1.35		1.29		
CSB PWR OUT	0.20 TO 1.95	0.8		0.75		
DC IN	2.2 TO 3.5	27.5		26.8		
DC IN	1.0 TO 6.7	3.8		3.64		
SBO PWR OUT	0.20 TO 2.5	0.82		0.98		
COURSE MONITOR 1						
TEST DDM	0.500 ± 0.02	0.504		0.504		
COURSE DDM	0.000 ± 0.011	.002/90		.002/90		
WIDTH DDM	0.141 TO 0.175	0.155		0.155		
RF LEVEL	100.0 ± 10.0	100.7		101.8		
% MOD	LAST FC ± 4.0%	41.2		41.2		
ID% MOD	005.0 ± 2.0	5.1		5.1		
COURSE MONITOR 2						
TEST DDM	0.500 ± 0.02	0.503		0.504		
COURSE DDM	0.000 ± 0.011	.002/90		.002/90		
WIDTH DDM	0.141 TO 0.175	0.155		0.155		
RF LEVEL	100.0 ± 10.0	100.3		101.4		
% MOD	LAST FC ± 4.0%	40.0		39.9		
ID% MOD	005.0 ± 2.0	5.0		4.9		
CLEARANCE MONITOR 1						
TEST DDM	0.500 ± 0.02	0.510		0.510		
COURSE DDM	0.000 ± 0.026	.001/90		.002/90		
WIDTH DDM	0.129 TO 0.181	0.158		0.155		
RF LEVEL	100.0 ± 10.0	100.9		100.8		
% MOD	LAST FC ± 4.0%	41.9		43.5		
ID % MOD	005.0 ± 2.0	5.1		5.2		
FREQ SEP	9.5 ± 1.0	9.4		9.4		
CLEARANCE MONITOR 2						
TEST DDM	0.500 ± 0.02	0.504		0.503		
COURSE DDM	0.000 ± 0.026	.001/90		.003/90		
WIDTH DDM	0.129 TO 0.181	0.158		0.156		
RF LEVEL	100.0 ± 10.0	100.9		100.7		
% MOD	LAST FC ± 4.0%	41.1		42.6		
ID % MOD	005.0 ± 2.0	4.9		5.0		
FREQ SEP	9.5 ± 1.0	9.4		9.4		
ALARM LIMITS						
COURSE MONITOR		MONITOR 1		MONITOR 2		
ID % MOD LOWER	003.0 ± 0.5	3.1		2.8		
UPPER	18.40 ± 3.0	18.0		18.4		
% MOD LOWER	004.0 BELOW NORMAL	36.1		36.0		
UPPER	004.0 ABOVE NORMAL	44.2		43.9		
RF LEVEL LOWER	90.0 ± 0.5	89.8		89.9		
WIDTH DDM LOWER	0.141 ± 0.002	0.140		0.141		
UPPER	0.175 ± 0.002	0.177		0.174		
COURSE DDM						
UPPER	0.011 ± 0.004	0.011		0.010		
TEST DDM LOWER	0.426 ± 0.03	0.412		0.412		
UPPER	0.557 ± 0.03	0.540		0.542		

REMARKS

MONITOR ALRAMS ***(CONTINUED)***

CHECK		SPECIFICATION	MONITOR 1		MONITOR 2		REMARKS
			INITIAL	ADJUSTED	INITIAL	ADJUSTED	
CLEARANCE MONITOR ALARM LIMITS							
FREQ SEP	LOWER	5.000 ± 0.2	4.9		4.9		
	UPPER	14.00 ± 0.2	13.9		14.0		
ID % MOD	LOWER	003.0 ± 0.5	3.0		3.1		
	UPPER	018.4 ± 3.0	17.0		17.1		
% MOD	LOWER	4.0 BELOW NORMAL	39.3		38.2		
	UPPER	4.0 ABOVE NORMAL	46.7		45.3		
RF LEVEL	LOWER	90.0 ± 0.5	89.9		89.9		
WIDTH DDM	LOWER	0.129 ± 0.002	0.136*	0.129	0.129		
	UPPER	0.181 ± 0.002	0.183		0.180		
COURSE DDM							
	UPPER	0.026 ± 0.004	0.026		0.026		
TEST DDM	LOWER	0.426 ± 0.03	0.412		0.407		
	UPPER	0.557 ± 0.03	0.538		0.534		

FAR FIELD MONITOR 1 TESTS	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
DDM	0.000 ± 0.005	.002/90		.001/90		
DDM ALARM	0.011 ± 0.004	0.011		0.011		
% MOD	40.0 ± 10.0	41.8		41.8		
% MOD ALARM	20.0 ± 1 0	20.0		20.0		
FAR FIELD MONITOR 2 TESTS						
DDM	0.000 ± 0.005	.001/90		.002/90		
DDM ALARM	0.011 ± 0.004	0.011		0.011		
% MOD	40.0 ± 10.0	42.0		42.0		
% MOD ALARM	20.0 ± 1.0	20.0		20.0		

REMARKS

SSILS LOCALIZER SUBSYSTEM PERFORMANCE CHECKS	DATE February 1980

LOCATION	EQUIPMENT AND SERIAL NUMBER	TECHNICIAN
Dyess AFB	AN/GRN-30 770011	TSgt Thibodeau

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
CARRIER FREQUENCY						
COURSE	0.002%	109.905015		109.90508		.002%=±2198Hz
CLEARANC	0.002%	109.895405		109.895604		.002%=±2198Hz
MODULATION BALANCE						
COURSE		.009/150		.006/150		
CLEARANCE		.004/150		.002/150		
PHASING						
COURSE 150Hz	3° far field	.060/150	.012/150	.020/150	.014/150	
COURSE 90Hz	3° far field	.030/90	.012/150	.004/90	.010/150	
CLEARANCE 150Hz	30° near field	.060/90	.008/150	.075/90	.009/150	
CLEARANCE 90Hz	30° near field	.048/150	.014/150	.070/150	.004/150	

ANTENNA VSWR

CHECK	SPECIFICATION	INITIAL	ADJUSTED	CHECK	SPECIFICATION	INITIAL	ADJUSTED
1L	less than	1.036		1R		1.039	
2L	1.2:1	1.015		2R		1.031	
3L		1.040		3R		1.047	
4L		1.068		4R		1.023	
5L		1.073		5R		1.025	
6L		1.029		6R		1.023	
7L		1.068		7R		1.057	

CABLING PHASE SHIFTS

ANTENNA FEEDLINES				MONITOR RETURN			
CHECK		INITIAL	ADJUSTED	CHECK		INITIAL	ADJUSTED
1L		233.4		1L		301.1	
2L		223.5		2L		300.0	
3L		223.5		3L		300.5	
4L		229.5		4L		300.0	
5L		223.1		5L		299.9	
6L		225.5		6L		299.5	
7L		224.2		7L		300.8	
1R		311.5		1R		302.8	
2R		304.5		2R		303.9	
3R		304.1		3R		301.8	
4R		308.0		4R		302.8	
5R		308.3		5R		303.2	
6R		315.5		6R		302.5	
7R		309.6		7R		302.4	

ANTENNA NULLS

PAIR	SPECIFICATION	INITIAL	ADJUSTED	PAIR	SPECIFICATION	INITIAL	ADJUSTED
1	1"/100'	2'4"150*		5	1"/100'	5" 90	
2		4" 150		6		6" 90	
3		12" 150*		7		3"150	
4		9" 150		COMP		4"150	

REMARKS

* out of tolerance

SSILS LOCALIZER SUBSYSTEM PERFORMANCE CHECKS

DATE	LOCATION	EQUIPMENT AND SERIAL NUMBER	TECHNICIAN
February 1980	Dyess AFB	AN/GRN-30 770011	TSgt Thibodeau

COURSE DU C+SB AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
7L(J9)	0.147 – 0.173	0.185*	7R(J16)	0.184*	7L–7R	±0.010	.001
6L(J8)	0.147 – 0.173	0.186*	6R(J15)	0.183*	6L–6R	±0.010	.003
5L(J7)	0.452 – 0.530	0.498	5R(J14)	0.495	5L–5R	±0.030	.003
4L(J6)	REF ± 0.030	0.491	4R(J13)	0.491	4L–4R	±0.030	0
3L(J5)	0.657 – 0.771	0.741	3R(J9)	0.714	3L–3R	±0.043	.027
2L(J4)	0.920 – 1.080	0.998	2R(J8)	0.965	2L–2L	±0.060	0.033
1L(J3)	0.821 – 0.964	0.886	1R(J7)	0.860	1L–1R	±0.054	0.026

COURSE DU C+SB SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
7L(J9)	+82	75.0	-7.0	7R(J16)	0	-2.0	-2.0	
6L(J8)	+82	75.0	-7.0	6R(J15)	0	-2.0	-2.0	
5L(J7)	+82	78.0	-4.0	5R(J14)	0	0	0	
4L(J6)	+82	78.0	-4.0	4R(J13)	0	0	0	
3L(J5)	+82	82.0	0	3R(J9)	0	+3.0	+3.0	
2L(J4)	+82	78.0	-4.0	2R(J8)	0	+1.0	+1.0	
1L(J3)	+82	78.0	-4.0	1R(J7)	0	0	0	

COURSE DU SBO AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
7L(J9)	0.330 – 0.404	0.390	7R(J16)	0.382	7L–7R	±0.012	0.008
6L(J8)	0.443 – 0.599	0.565	6R(J15)	0.562	6L–6R	±0.018	0.003
5L(J7)	0.818 – 0.960	0.929	5R(J14)	0.934	5L–5R	±0.029	0.005
4L(J6)	REF + 0.033	1.006	4R(J13)	1.000	4L–4R	±0.033	0.006
3L(J5)	0.921 – 1.060	1.090*	3R(J9)	1.027	3L–3R	±0.033	0.063*
2L(J4)	0.614 – 0.720	0.662	2R(J8)	0.673	2L–2R	±0.022	0.011
1L(J3)	0.204 – 0.240	0.247*	1R(J7)	0.247*	1L–1R	±0.014	0

COURSE DU SBO SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
7L(J9)	-98	-101.0	-3.0	7R(J16)	0	+2.0	+2.0	
6L(J8)	-98	-100.0	-2.0	6R(J15)	0	+1.0	+1.0	
5L(J7)	-98	-97.0	+1.0	5R(J14)	0	0	0	
4L(J6)	-98	-98.0	0	4R(J13)	0	-2.0	-2.0	
3L(J5)	-98	-96.0	+2.0	3R(J9)	0	-2.0	-2.0	
2L(J4)	-98	-99.0	-1.0	2R(J8)	0	-1.0	-1.0	
1L(J3)	-98	-105.0	-7.0	1R(J7)	0	+5.0	+5.0	

COURSE PHASE ERROR

CHECK	CSB ERR	SBO ER	DIFF	CHECK	CSB ERR	SBO ER	DIFF	REMARKS
7L(J9)	-7.0	-3.0	-4.0	7R(J16)	-2.0	+2.0	-4.0	
6L(J8)	-7.0	-2.0	-5.0	6R(J15)	-2.0	+1.0	-3.0	
5L(J7)	-4.0	+1.0	-5.0	5R(J14)	0	0	0	
4L(J6)	-4.0	0	-4.0	4R(J13)	0	0	0	
3L(J5)	0	+2.0	-2.0	3R(J9)	+3.0	-2.0	+5.0	
2L(J4)	-4.0	-1.0	-3.0	2R(J8)	+1.0	-1.0	+2.0	
1L(J3)	-4.0	-7.0	+3.0	1R(J7)	0	+5.0	-5.0	
SPREAD								10.0

REMARKS

* out of tolerance

 AFCC FORM 938C

DISTRIBUTION UNIT CHECKS *(Continued)*

CLEARANCE DU C+SB AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
3L(J5)	0.134 – 0.216	0.240*	3R(J9)	0.229*	3L–3R	±0.012	0.011
1L(J3)	REF ±0.060	1.016	1R(J7)	1.000	1L–1R	±0.060	0.016

CLEARANCE C+SB SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
3L(J5)	+82	+80.0	-2.0	3R(J9)	0	+1.0	+1.0	
1L(J3)	+82	+82.0	0	1R(J7)	0	0	0	

CLEARANCE DU SBO AMPLITUDES

CHECK	SPECIFICATION	MEAS	CHECK	MEAS	CHECK	BAL	MEAS
3L(J5)	0.121 – 0.157	0.139	1R(J9)	0.143	3L–3R	±0.005	0.004
2L(J4)	0.306 – 0.360	0.334	2R(J8)	0.333	2L–2R	±0.010	0.001
1L(J3)	REF ±0.033	0.999	1R(J7)	1.000	1L–1R	±0.033	0.001

CLEARANCE SBO SIGNAL PHASE

CHECK	NOMINAL	MEAS	ERROR	CHECK	NOMINAL	MEAS	ERROR	REMARKS
3L(J5)	-98	-87.0	+11.0	3R(J9)	0	+7.0	+7.0	
2L(J4)	-98	-104.0	-6.0	2R(J8)	0	+4.0	+4.0	
1L(J3)	-98	-101.0	-3.0	1R(J7)	0	0	0	

CLEARANCE PHASE ERROR

CHECK	CSB ERR	SBO ERR	DIFF	CHECK	CSB ERR	SBO ERR	DIFF	REMARKS
3L(J5)	-2.0	+11.0	-13.0	3R(J9)	+1.0	+7.0	-6.0	
2L(J4)	—	-6.0	+6.0	2R(J8)	—	+4.0	-4.0	
1L(J3)	0	-3.0	+3.0	1R(J7)	0	0	0	

REMARKS

Clearance phase error = 19.0

Clearance nulls

PAIR	
1	2'9 "/150
2	8 "/150
3	1' 5 "/150
COMPOSITE	7 "/150

* out of tolerance

ILS LOCALIZER GROUND CHECK RECORD
(300 Meters/984.25′ From Course Radiators)

FACILITY LOCATION	EQUIPMENT SERIAL NO.	MONTH AND YEAR
DYESS AFB RUNWAY 16	AN/GRN-30 SN 77011	February 1980

DATE		1 FEB		1 FEB		2 FEB		2 FEB		2 FEB		2 FEB	
FUNCTION		COMPOSITE INITIAL		COMPOSITE INITIAL		COURSE ONLY		COURSE ONLY		CLEARANCE ONLY		CLEARANCE ONLY	
XMTR NO.		1 DDM	1 dBm	2 DDM	2 dBm	1 DDM	1 dBm	2 DDM	2 dBm	1 DDM	1 dBm	2 DDM	2 dBm
90HZ	35	.305	-50	.300	-50	.220*	-61	.220*	-61	.350	-51	.325	-51
	30	.320	-48	.345	-48	.035	-59	.030	-59	.365	-49	.350	-49
	25	.340	-48	.350	-47	.035*	-61	.018*	-61	.355	-48	.355	-49
	20	.320	-52	.355	-51	.100*	-75	.120*	-74	.350	-53	.340	-51
	15	.340	-49	.340	-49	.007*	-67	.031*	-68	.335	-49	.345	-49
	10	.355	-46	.360	-46	.220	-63	.290	-58	.375	-47	.360	-46
	9	.340	-46	.360	-45	.225	-58	.290	-54	.380	-46	.375	-46
	8	.325	-45	.320	-44	.250	-54	.280	-50	.375	-45	.365	-45
	7	.315	-43	.310	-42	.260	-50	.300	-45	.350	-45	.340	-44
	6	.310	-41	.310	-40	.285	-46	.310	-42	.315	-44	.300	-44
DEGREES FROM EXTENDED RUNWAY CENTERLINE	5	.325	-39	.315	-38	.330	-42	.340	-39	.240	-44	.225	-43
	4	.320	-37	.315	-36	.340	-39	.350	-37	.185	-43	.175	-43
	3	.305	-35	.275	-34	.360	-37	.300	-35	.135	-43	.130	-43
	2	.185	-34	.175	-33	.200	-34	.190	-33	.090	-43	.055	-42
	1	.090	-33	.080	-33	.090	-33	.110	-32	.050	-43	.035	-42
	0	.005/150	-33	.005/150	-32	.004/150	-32	.001/150	-32	0	-42	.005/150	-42
	1	.095	-33	.090	-32	.100	-34	.090	-32	.045	-42	.050	-42
	2	.190	-34	.180	-34	.205	-34	.200	-33	.095	-43	.105	-43
	3	.300	-35	.260	-35	.315	-36	.310	-35	.145	-43	.145	-43
	4	.320	-37	.315	-36	.370	-37	.370	-36	.195	-44	.180	-43
	5	.320	-39	.320	-38	.370	-40	.380	-39	.240	-44	.245	-44
	6	.325	-41	.320	-41	.355	-43	.360	-42	.300	-44	.300	-44
	7	.310	-43	.320	-42	.340	-46	.340	-45	.320	-45	.320	-45
	8	.325	-44	.330	-44	.325	-50	.320	-49	.350	-45	.375	-45
	9	.340	-46	.360	-46	.320	-55	.320	-53	.370	-47	.375	-46
150HZ	10	.360	-46	.360	-46	.335	-57	.330	-56	.360	-47	.380	-46
	15	.360	-50	.355	-49	.330*	-79	.280*	-77	.340	-51	.360	-49
	20	.350	-51	.365	-51	.095	-68	.070	-67	.350	-51	.365	-50
	25	.350	-50	.375	-50	.009	-60	.012	-67	.380	-51	.385	-49
	30	.355	-50	.350	-50	.110	-60	.120	-59	.370	-51	.380	-50
	35												

REMARKS: * INDICATES REVERSE SENSING

ILS LOCALIZER GROUND CHECK RECORD

(300 Meters/984.25' From Course Radiators)

FACILITY LOCATION	EQUIPMENT SERIAL NO.	MONTH AND YEAR
DYESS AFB RUNWAY 16	AN/GRN-30 SN 77011	February 1980

DATE		2 FEB		3 FEB		3 FEB		3 FEB		10 FEB		10 FEB	
FUNCTION		COURSE QUAD		CLEARANCE QUAD		WORSE CASE		CRS SBO	CLEA SBO	COURSE QUAD		CLEARANCE QUAD	
XMTR NO.		1 DDM	2 DDM	1 DDM	2 DDM	1 DDM	2 DDM	1 dBm	1 dBm	1 DDM	2 DDM	1 DDM	2 DDM
DEGREES FROM EXTENDED RUNWAY CENTERLINE — 90HZ	35	.065*	.027*	.310	.265	.335	.340	-64	-44	.025*	.028*	.020*	.008*
	30	.047*	.048*	.280	.200	.355	.350	-74	-44	.041*	.045*	.014*	.004*
	25	.120	.130	.220	.170	.350	.360	-72	-43	.140	.120	.036*	.028*
	20	.370*	.380*	.180	.130	.365	.350	-74	-46	.380*	.380*	.110*	.090*
	15	.185*	.220*	.125	.080	.345	.350	-73	-43	.195*	.190*	.150*	.150*
	10	.290*	.345*	.070	.020	.350	.360	-68	-43	.285*	.310*	.135*	.135*
	9	.290*	.325*	.044	.015	.335	.350	-43	-44	.285*	.310*	.125*	.120*
	8	.270*	.340*	.038	.012	.310	.320	-40	-45	.300*	.310*	.110*	.115*
	7	.190*	.295*	.034	.010	.295	.300	-37	-45	.260*	.270*	.090*	.080*
	6	.120*	.185*	.026	.008	.300	.300	-36	-47	.175*	.185*	.080*	.080*
	5	.075*	.135*	.021	.002	.305	.310	-35	-48	.130*	.130*	.070*	.065*
	4	.048*	.100*	.016	.002	.320	.320	-35	-49	.090*	.085*	.049*	.060*
	3	.034*	.065*	.011	.001	.320	.300	-36	-51	.065*	.070*	.038*	.035*
	2	.022*	.035*	.007	.001*	.210	.205	-38	-55	.039*	.039*	.024*	.024
	1	.015*	.022*	0	.002*	.105	.100	-44	-60	.023*	.022*	.013*	.009*
	0	.009/150	.010/150	.005/150	.007/150	.003/150	.002/150	-73	-87	.009/150	.007/150	.001/150	.001/150
150HZ	1	.003	.006*	.009	.008	.110	.115	-44	-61	.004*	.010*	.010*	.014*
	2	.003*	.024*	.014	.009	.210	.210	-39	-54	.006*	.022*	.026*	.030*
	3	.013*	.044*	.018	.010	.305	.310	-36	-52	.045*	.065*	.040*	.045*
	4	.030*	.080*	.025	.012	.335	.350	-35	-49	.075*	.095*	.060*	.080*
	5	.080*	.120*	.030	.013	.325	.350	-35	-47	.125*	.135*	.070*	.075*
	6	.130*	.185*	.034	.014	.315	.330	-36	-46	.190*	.185*	.095*	.100*
	7	.220*	.280*	.038	.015	.315	.330	-38	-45	.285*	.280*	.110*	.115*
	8	.300*	.245*	.043	.018	.325	.330	-40	-44	.285*	.260*	.125*	.135*
	9	.300*	.230*	.048	.019	.340	.350	-44	-44	.270*	.260*	.140*	.145*
	10	.300*	.260*	.050	.023	.350	.370	-48	-43	.290*	.260*	.150*	.155*
	15	.135*	.125*	.115	.090	.360	.380	-71	-43	0	.040	.155*	.170*
	20	.105*	.110*	.185	.140	.375	.380	-74	-44	.080*	.090	.080*	.085*
	25	.095	.090	.220	.185	.355	.360	-73	-45	.085	.080	.014*	.025*
	30	.045*	.075*	.275	.225	.340	.370	-69	-44	.060*	.060*	.008	.009
	35												

REMARKS: * INDICATES REVERSE SENSING

ILS LOCALIZER GROUND CHECK RECORD

(300 Meters/984.25′ From Course Radiators)

FACILITY LOCATION	EQUIPMENT SERIAL NO.	MONTH AND YEAR
DYESS AFB RUNWAY 16	AN/GRN-30 SN 77011	February 1980

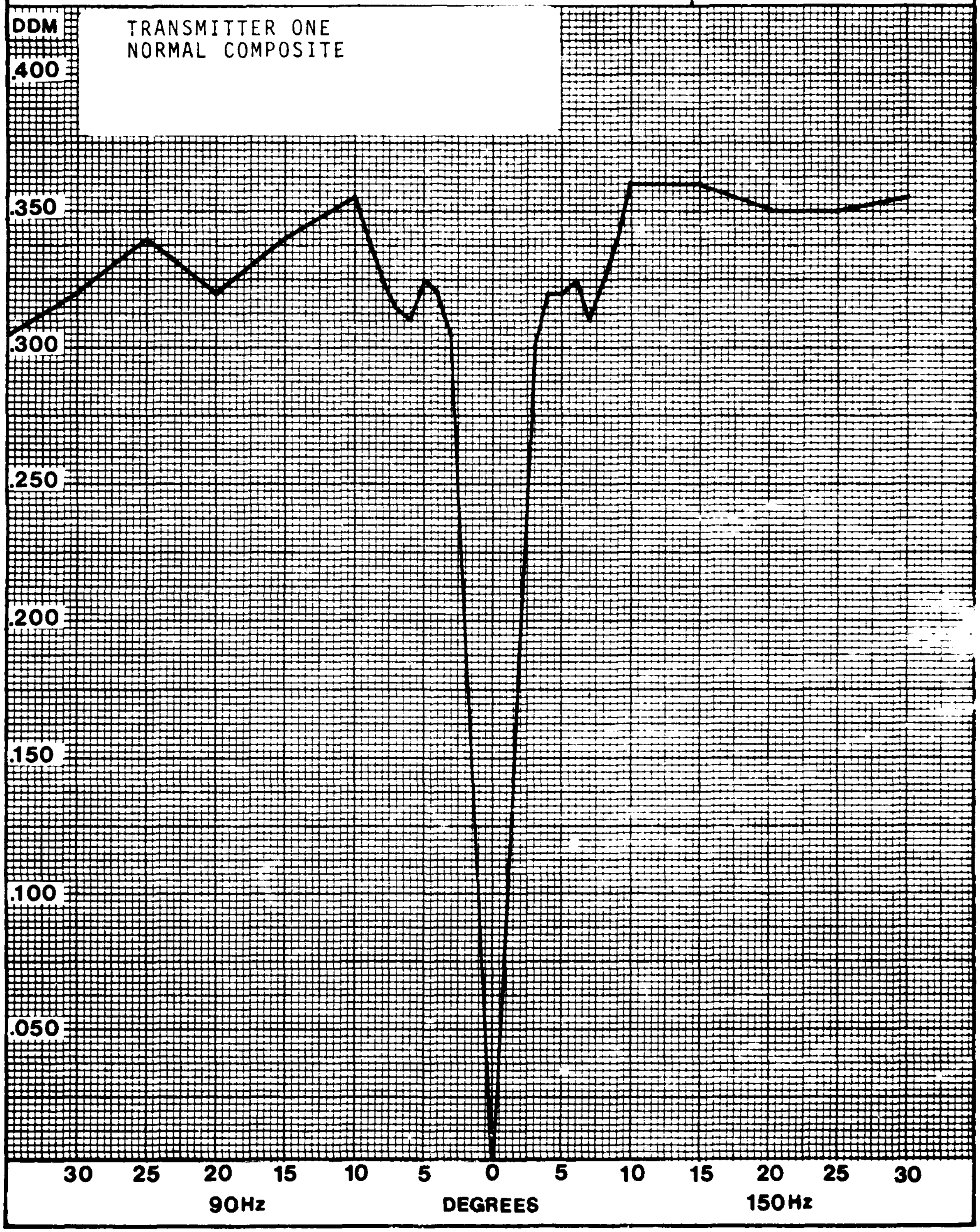
	DATE	18 FEB		18 FEB									
	FUNCTION	COMPOSITE FINAL		CLEARANCE QUAD									
	XMTR NO.	1	2	1	2								
90HZ	35	.330	.325	.070*	.025*								
	30	.350	.340	.048*	.070*								
	25	.350	.350	.105	.105								
	20	.350	.335	.370*	.385*								
	15	.350	.345	.195*	.175*								
	10	.355	.355	.280*	.340*								
	9	.340*	.350	.290*	.340*								
	8	.320	.315	.280*	.350*								
	7	.305	.310	.180*	.305*								
	6	.300	.310	.115*	.210*								
DEGREES FROM EXTENDED RUNWAY CENTERLINE	5	.315	.320	.085*	.155*								
	4	.320	.320	.070*	.120*								
	3	.280	.260	.032*	.085*								
	2	.175	.165	.023*	.060*								
	1	.080	.085	.018*	.028*								
	0	.008/150	.007/150	.010/150	.006/150								
	1	.100	.100	.002	.003*								
	2	.185	.175	.002*	.028*								
	3	.270	.270	.011*	.060*								
	4	.330	.325	.050*	.085*								
	5	.340	.335	.070*	.130*								
	6	.320	.335	.115*	.185*								
	7	.320	.335	.240*	.300*								
	8	.330	.335	.300*	.250*								
	9	.350	.350	.295*	.245*								
150HZ	10	.370	.360	.300*	.275*								
	15	.370	.390	.290*	.035*								
	20	.360	.390	.110*	.105*								
	25	.360	.390	.090	.095								
	30	.365	.390	.060*	.075*								
	35												

REMARKS	* INDICATES REVERSE SENSING

TITLE:

LOCALIZER GROUND CHECK GRAPH

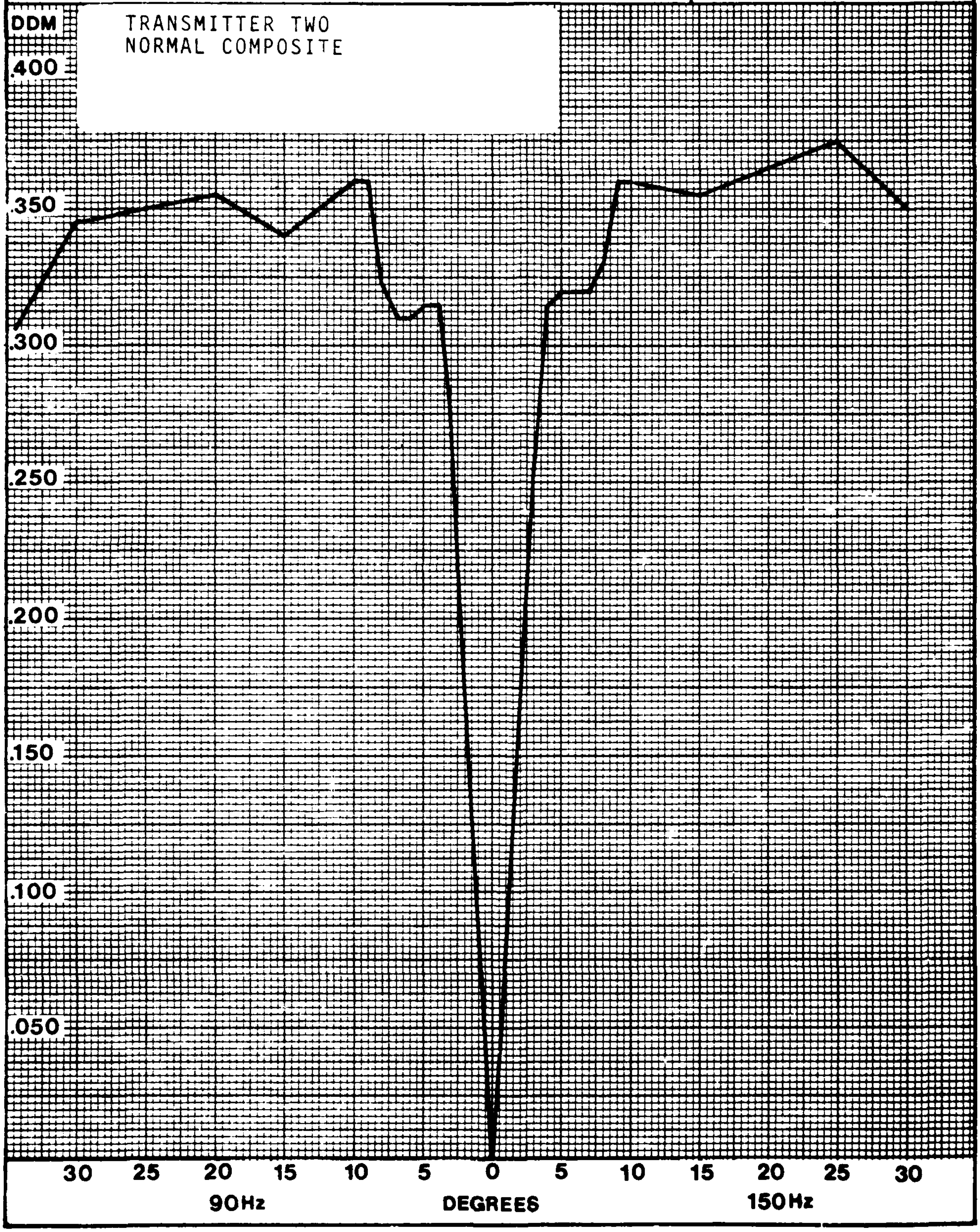
LOCATION	DATE
Dyess AFB	1 February 1980



TITLE: LOCALIZER GROUND CHECK GRAPH

LOCATION: Dyess AFB

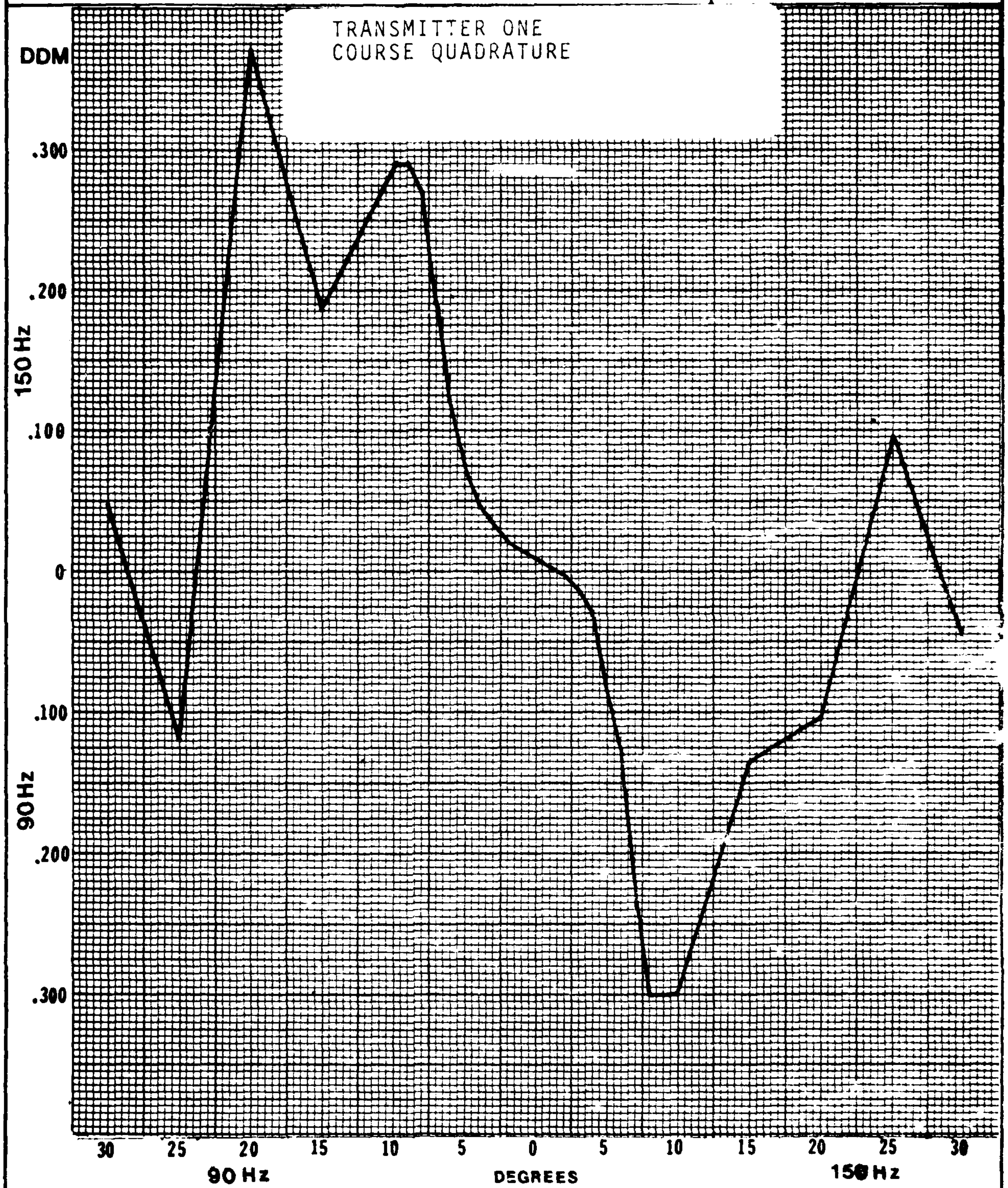
DATE: 1 February 1980



TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION	DATE
Dyess AFB	2 February 1980



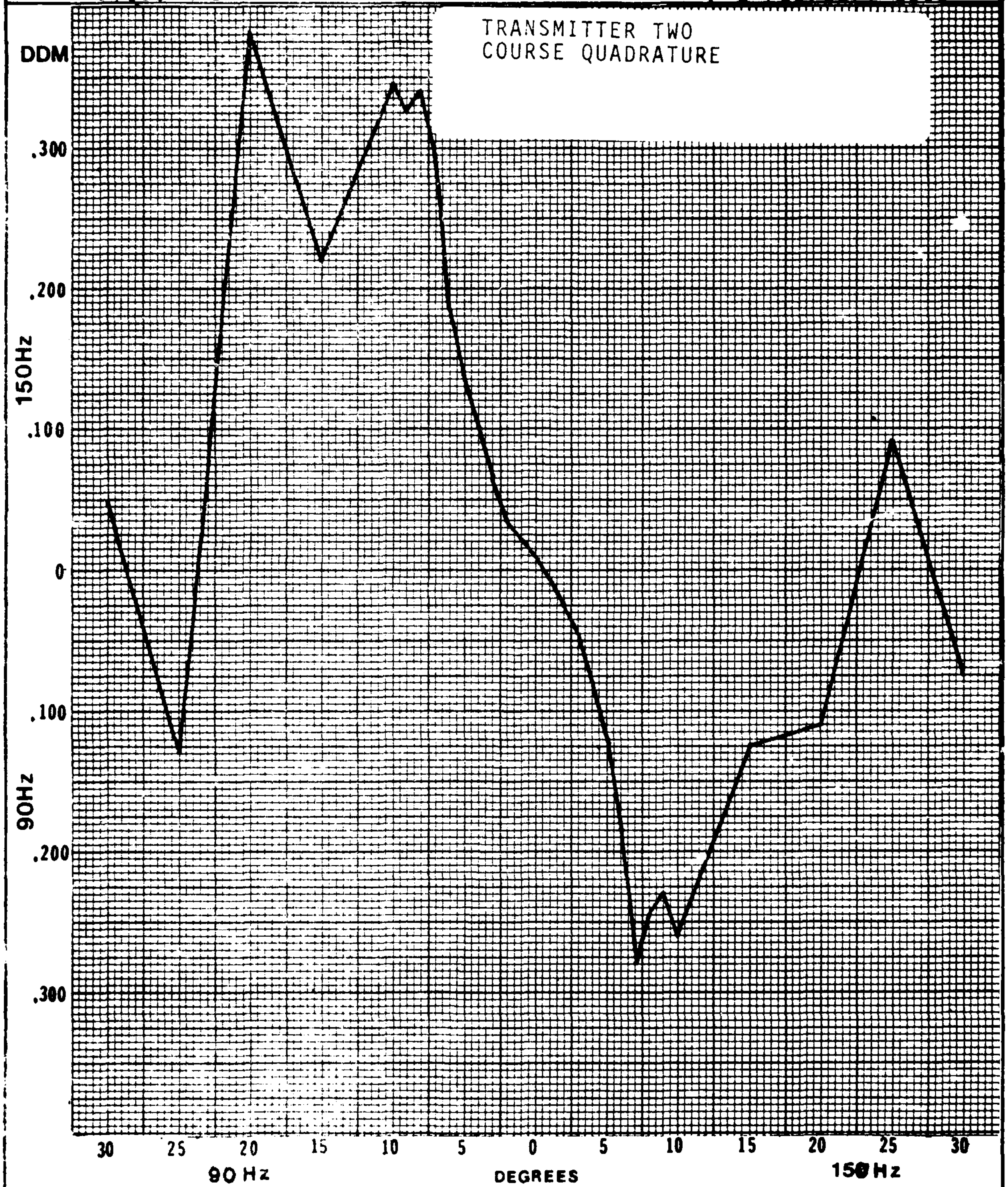
REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION	DATE
Dyess AFB	2 February 1980



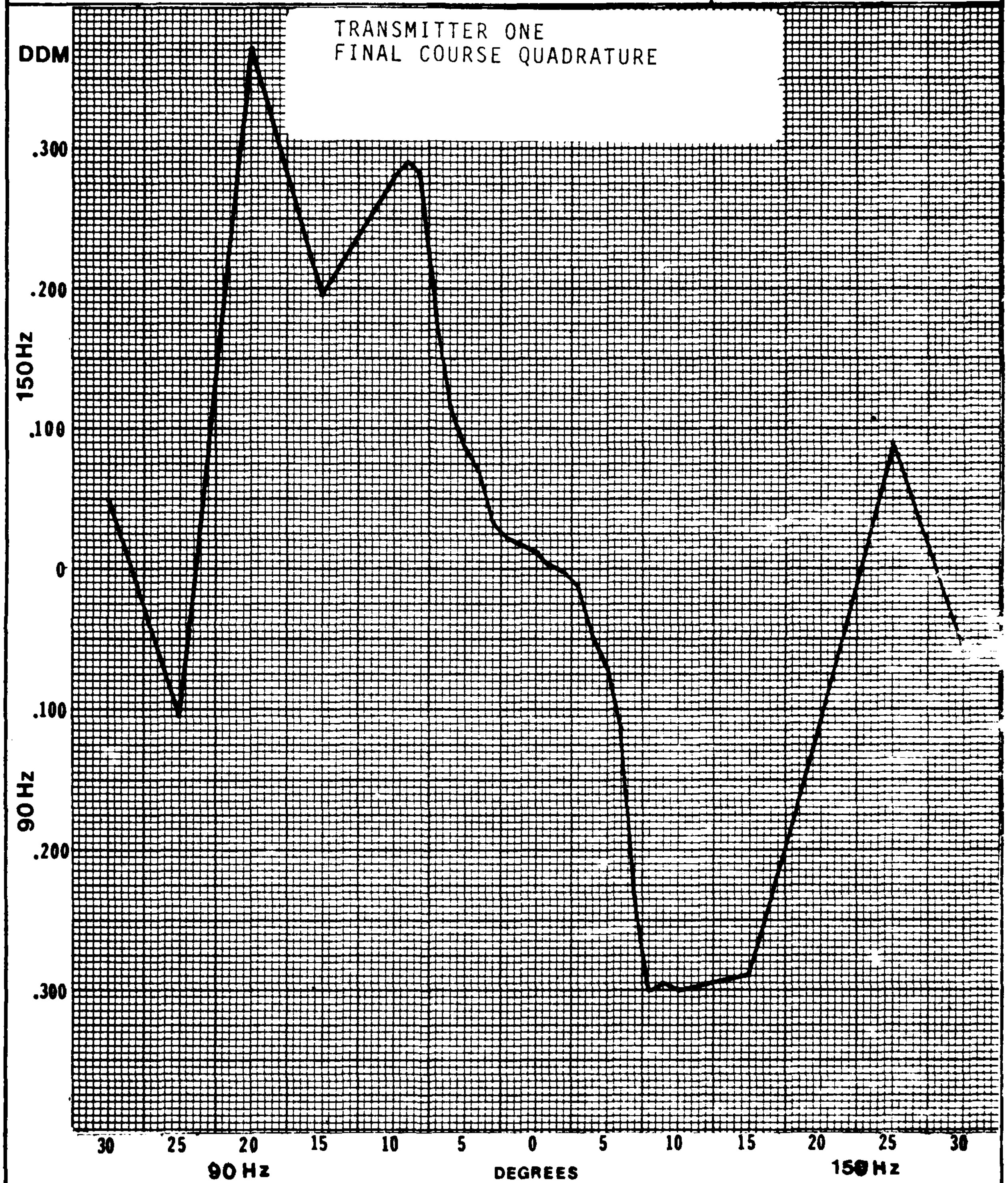
REMARKS

TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION: Dyess AFB

DATE: 18 February 1980

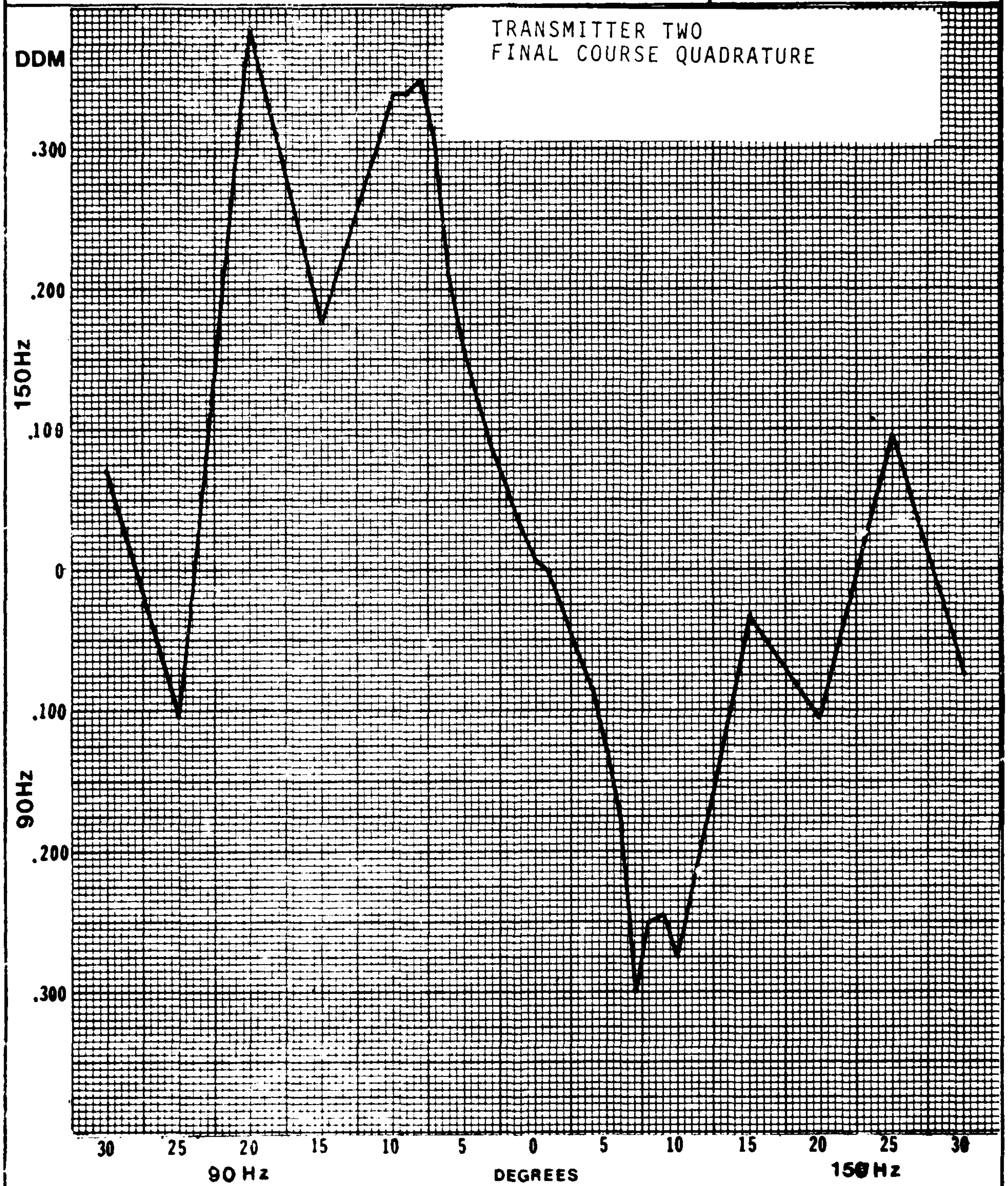


REMARKS

TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION	DATE
Dyess AFB	18 Februauy 1980



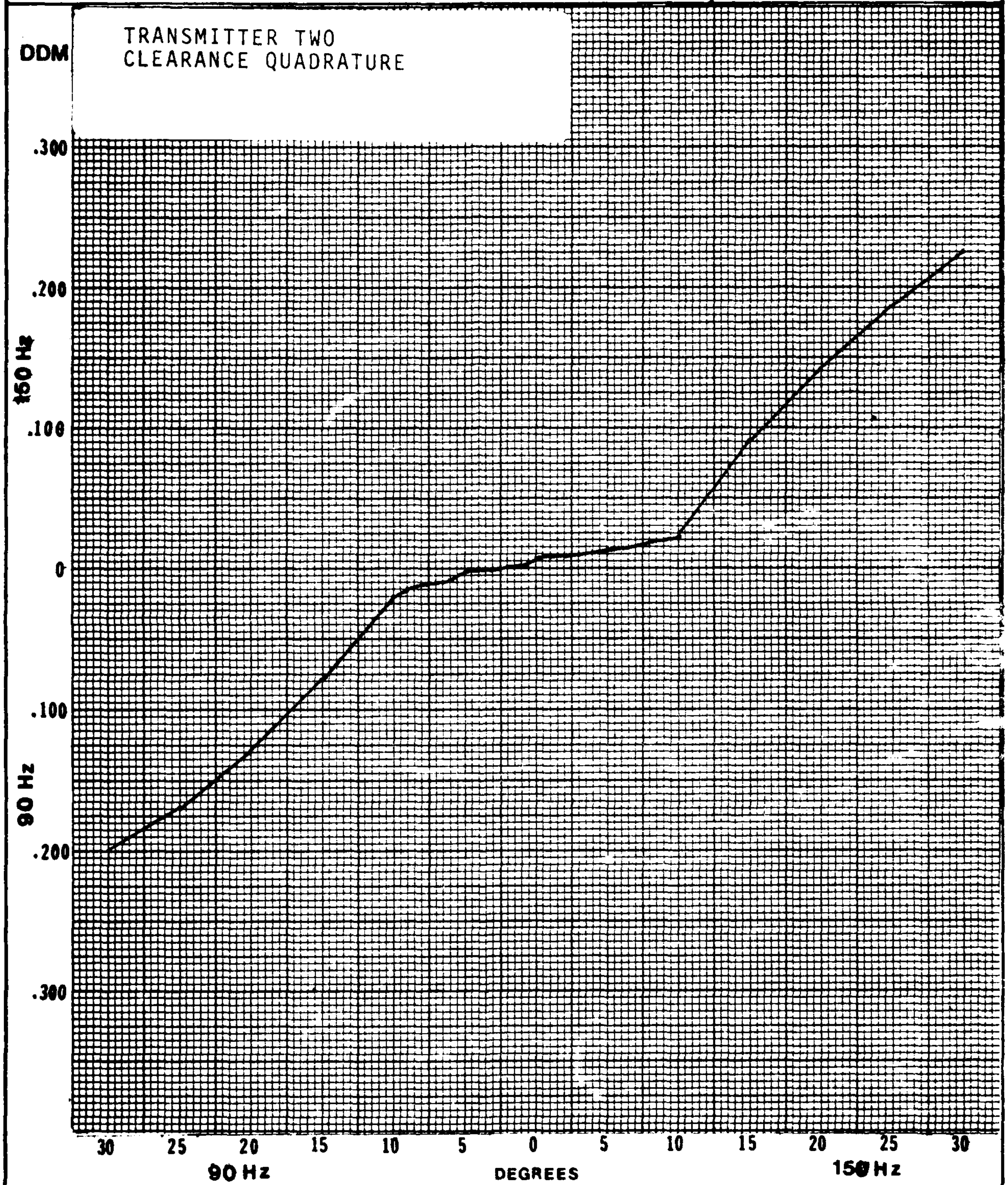
REMARKS

TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION	DATE
Dyess AFB	3 February 1980

TRANSMITTER TWO
CLEARANCE QUADRATURE



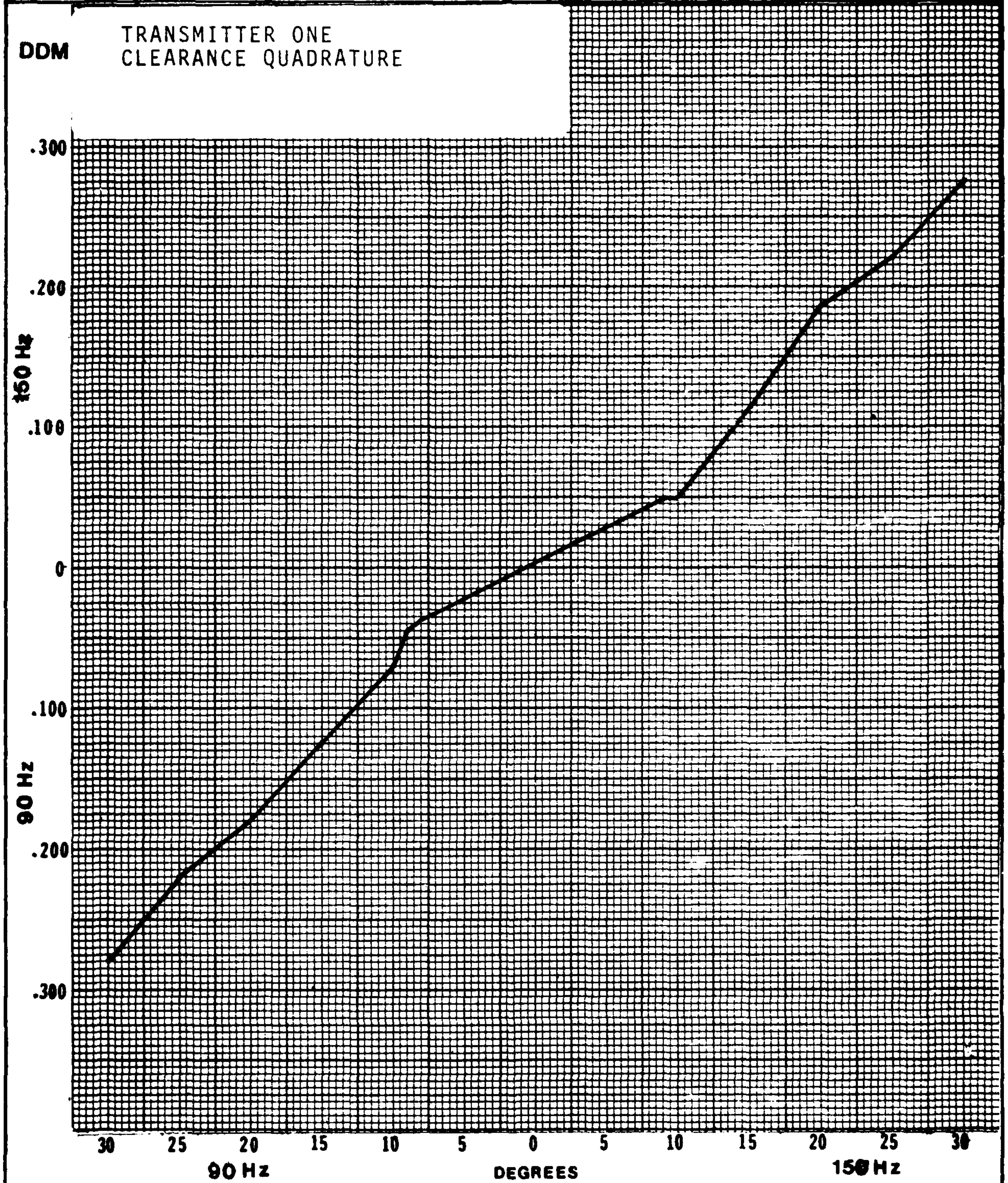
REMARKS

TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION: Dyess AFB

DATE: 3 February 1980



REMARKS

TITLE:

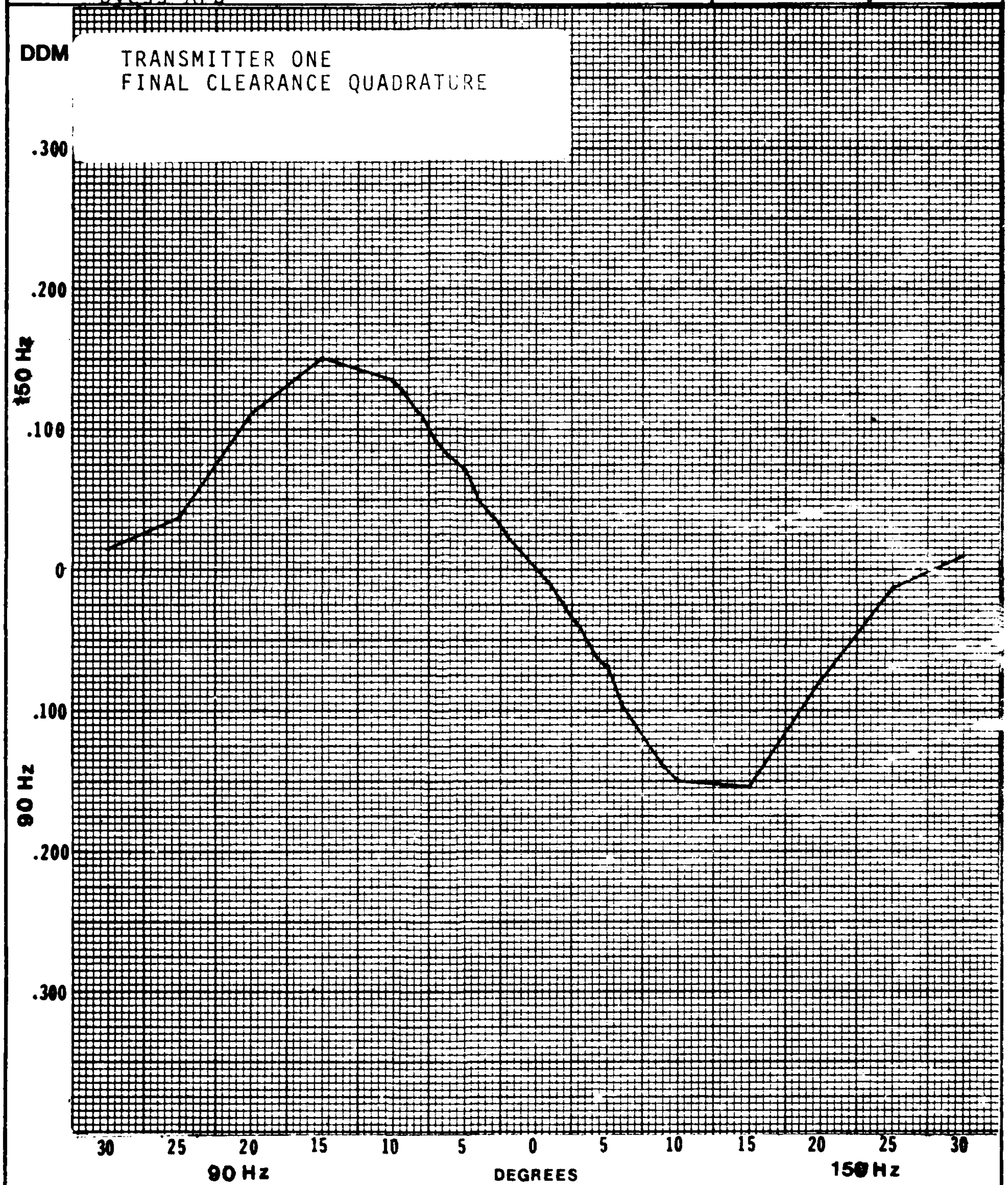
LOCALIZER GROUND CHECK GRAPH

LOCATION

Dyess AFB

DATE

10 February 1980



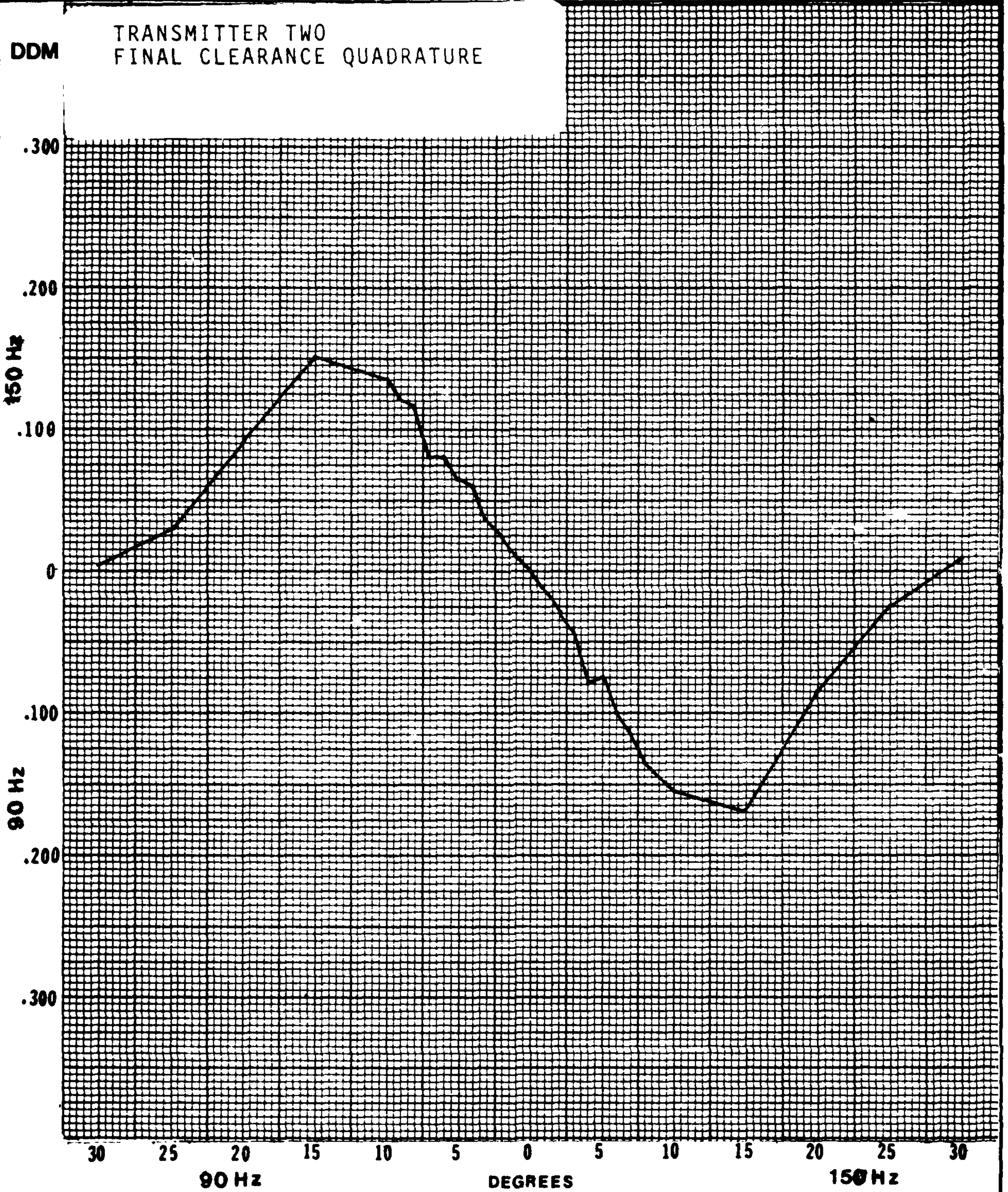
REMARKS

TITLE

LOCALIZER GROUND CHECK GRAPH

LOCATION	DATE
Dyess AFB	10 February 1980

TRANSMITTER TWO
FINAL CLEARANCE QUADRATURE



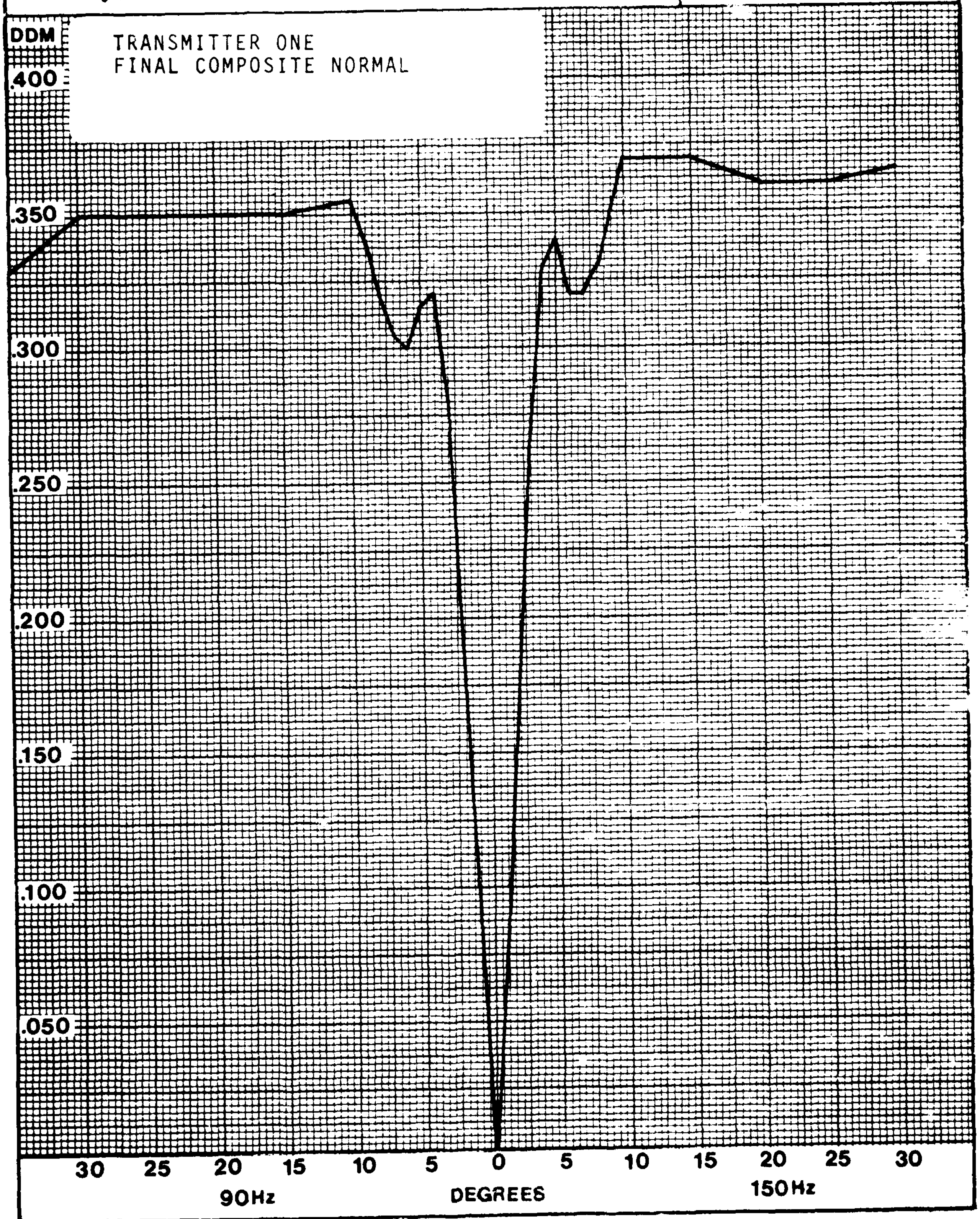
REMARKS

TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION Dyess AFB

DATE 18 February 1980

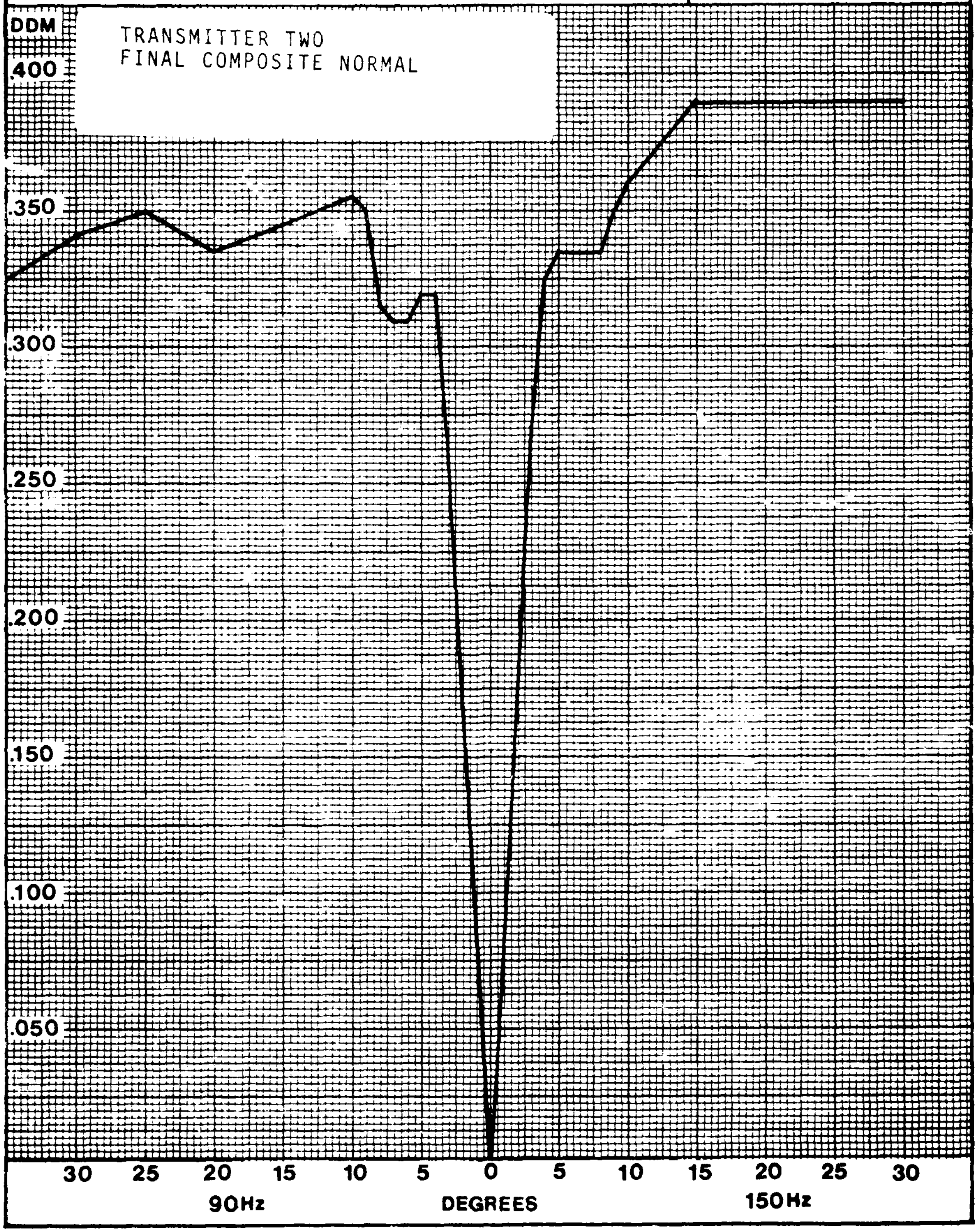


TITLE:

LOCALIZER GROUND CHECK GRAPH

LOCATION: Dyess AFB

DATE: 18 February 1980



TITLE:

LOCALIZER POSITIVE INTERLOCK RFI

LOCATION: Dyess AFB

DATE: February 1980

RFI checks of Runway 16 Localizer using the vector voltmeter are as follows:

Measured at outputs of the switching unit with transmitter 1 on standby and dummy loaded, transmitter 2 off.

Course	C+SB	-12.4 dBm
Course	SBO	-32.4 dBm
Clearance	C+SB	-29.8 dBm
Clearance	SBO	-33.0 dBm

With transmitter 2 on standby and dummy loaded and transmitter 1 off, the measurements showed little or no difference.

An alternate method for this check was accomplished. The portable field detector (PFD) AN/GRM-103 was used. Measurements were taken with the same equipment configuration as depicted in the above chart, results are shown below.

Course	C+SB	-37.0 dBm
Course	SBO	-32.0 dBm
Clearance	C+SB	-21.0 dBm
Clearance	SBO	-33.0 dBm

REMARKS

TITLE

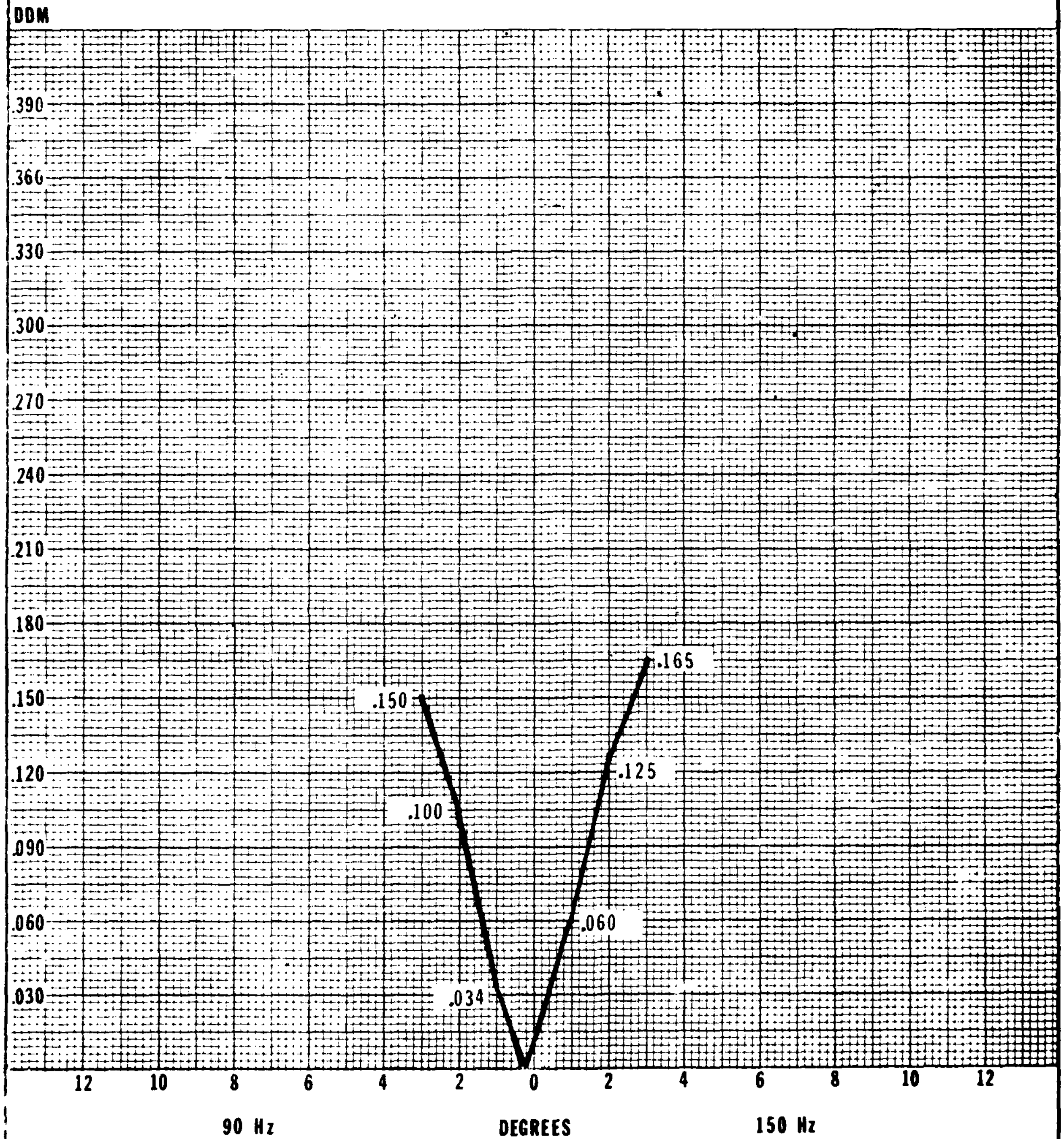
LOCALIZER POSITIVE INTERLOCK RFI

LOCATION

Dyess AFB

DATE

12 February 1980



REMARKS

LOCALIZER 16 DUMMY LOADED -- LOCALIZER 34 OFF

TITLE

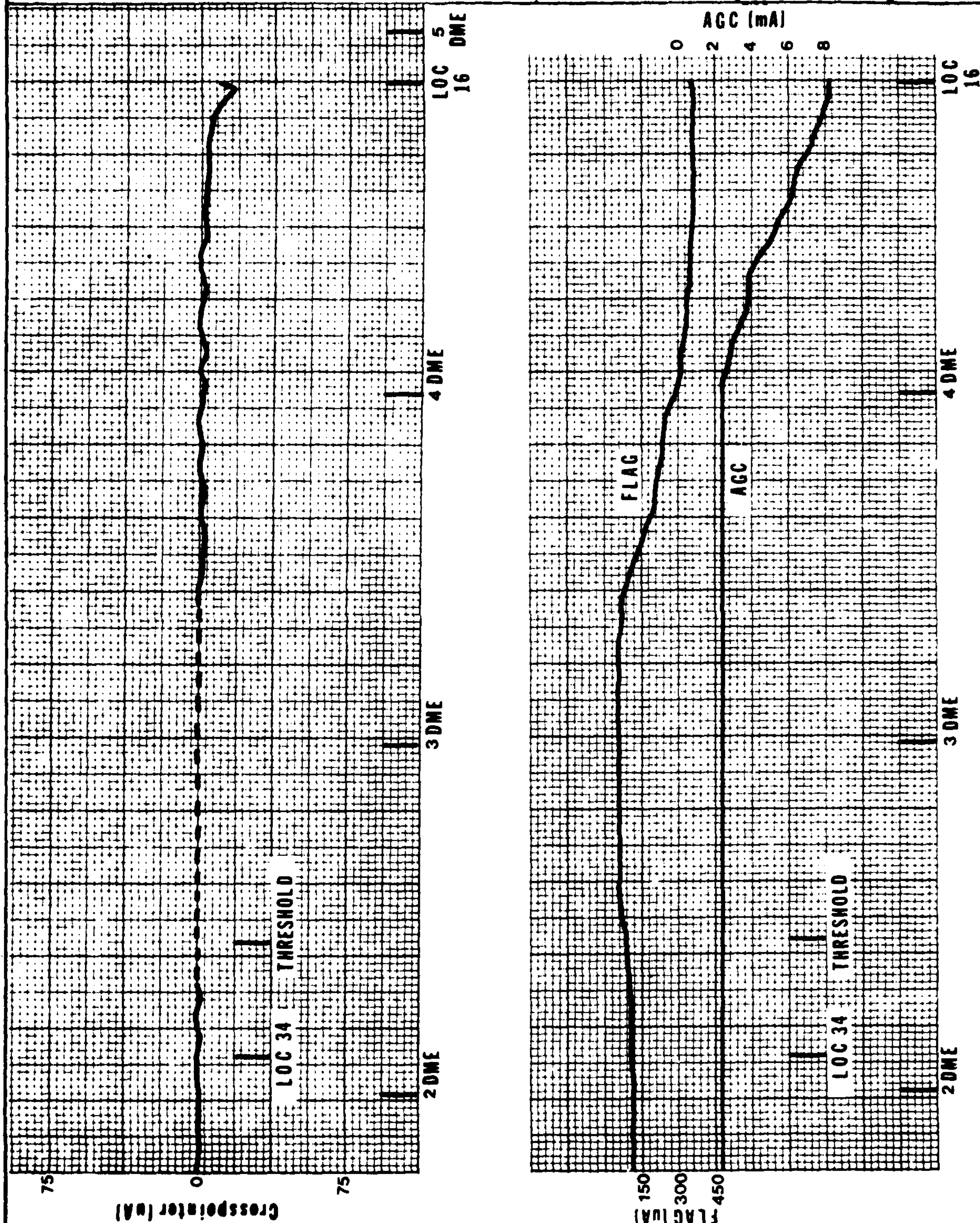
LOCALIZER POSITIVE INTERLOCK RFI

LOCATION

Dyess AFB

DATE

12 February 1980



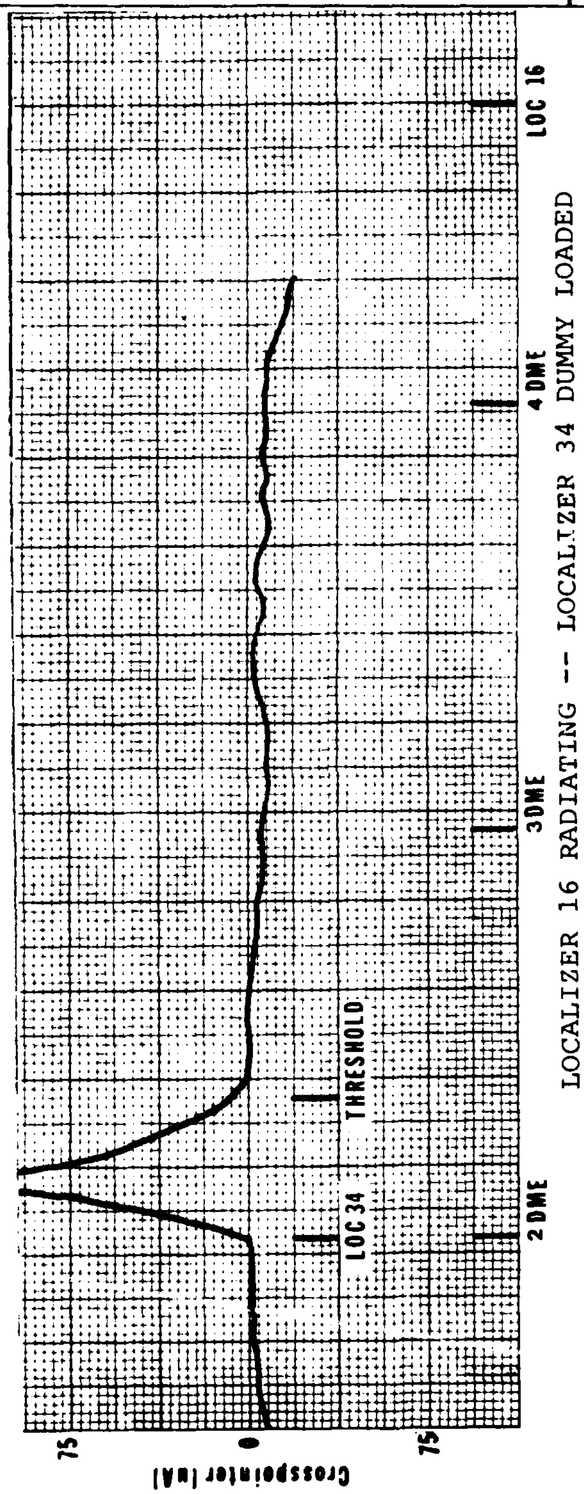
REMARKS

LOCALIZER 16 DUMMY LOADED -- LOCALIZER 34 OFF

TITLE

LOCALIZER POSITIVE INTERLOCK RFI

LOCATION	DATE
Dyess AFB	12 February 1980



REMARKS

SSILS LOC. PRE-POST AIRBORNE EVALUATION CHECKLIST						DATE 12 February 1980
CHECK	SPECIFICATION	TRANSMITTER NO 1 PRE	TRANSMITTER NO 1 POST	TRANSMITTER NO 2 PRE	TRANSMITTER NO 2 POST	REMARKS
COURSE CARRIER POWER		15.0W	15.0W	15.0W	15.0W	
COURSE SB POWER		375mW	350mW	380mW	370mW	
CLEARANCE CARRIER POWER		4.5 W	4.5 W	4.5 W	4.5 W	
CLEARANCE SB POWER		136mW	125mW	140mW	127mW	
COURSE % MODULATION		39.4%	38%	39%	39%	
CLEARANCE % MODULATION		39%	39%	38%	39%	
MONITORS COURSE I						
COURSE DDM	0.000 ± 0.011	.007/90	.005/150	.005/90	.004/150	
WIDTH DDM	0.141 TO 0.175	.152	.155	.150	.155	
RF LEVEL	100.0 ± 10.0	99.6	100.4	101.1	99.5	
% MOD	LAST FC ± 0.004	40.8	41.2	41.2	41.3	
ID % MOD	005.0 ± 2.0	5.2	5.1	5.2	5.7	
COURSE II						
COURSE DDM	0.000 ± 0.011	.007/90	.004/150	.006/90	.003/150	
WIDTH DDM	0.141 TO 0.175	.152	.154	.151	.155	
RF LEVEL	100.0 ± 10.0	98.4	100.	99.6	99.2	
% MOD	LAST FC ± 0.004	39.7	40.0	40.0	40.1	
ID % MOD	005.0 ± 2.0	4.9	4.9	4.9	4.9	
CLEARANCE I						
COURSE DDM	0.000 ± 0.026	.001/90	.007/90	.015/90	.025/90	
WIDTH DDM	0.129 TO 0.181	.141	.155	.141	.140	
RF LEVEL	100.0 ± 10.0	98.0	100.	102.9	100.	
% MOD	LAST FC ± 0.004	42.0	43.5	42.1	42.1	
ID % MOD	005.0 ± 2.0	5.2	4.9	5.5	5.1	
FREQ SEP	9.5 ± 1.0	9.6	9.4	9.5	9.5	
CLEARANCE II						
COURSE DDM	0.000 ± 0.026	.004/90	.007/90	.003/90	.024/90	
WIDTH DDM	0.129 TO 0.181	.157	.155	.147	.140	
RF LEVEL	100.0 ± 10.0	98.1	100.	103.2	100.	
% MOD	LAST FC ± 0.004	41.1	42.6	41.4	41.2	
ID % MOD	005.0 ± 2.0	5.0	4.9	5.0	5.0	
FREQ SEP	9.5 ± 1.0	9.5	9.2	9.4	9.4	
FFM 1						
DDM	0.000 ± 0.005	.005/90	.005/150	.004/90	.005/90	
% MOD	40.0 ± 10.0	40.4	42.	42.	40.	
FFM 2						
DDM	0.000 ± 0.005	.004/90	.002/90	.004/90	.005/90	
% MOD	40.0 ± 10.0	41.	41.5	42	42.	

REMARKS

SSILS LOC. PRE-POST AIRBORNE EVALUATION CHECKLIST						DATE 13 February 1980
CHECK	SPECIFICATION	TRANSMITTER NO 1		TRANSMITTER NO 2		REMARKS
		PRE	POST	PPE	POST	
COURSE CARRIER POWER		15 W	15 W	15 W	15 W	
COURSE SB POWER		355mW	350mW	380mW	380mW	
CLEARANCE CARRIER POWER		4.5 W	4.5 W	4.5 W	4.5 W	
CLEARANCE SB POWER		130mW	132mW	140mW	135mW	
COURSE % MODULATION		39 %	38 %	39%	40 %	
CLEARANCE % MODULATION		40 %	41 %	39 %	43 %	
MONITORS COURSE I						
COURSE DDM	0.000 ± 0.011	.005/150	.000	.003/150	.001/90	
WIDTH DDM	0.141 TO 0.175	.155	.158	.154	.158	
RF LEVEL	100.0 ± 10.0	100.9	99.9	99.6	101.0	
% MOD	LAST FC ± 0.004	41.1	40.4	41.2	42.3	
ID % MOD	005.0 ± 2.0	5.0	5.2	5.1	5.2	
COURSE II						
COURSE DDM	0.000 ± 0.011	.004/150	.000	.002/90	.001/90	
WIDTH DDM	0.141 TO 0.175	.154	.156	.154	.156	
RF LEVEL	100.0 ± 10.0	100.7	99.2	99.3	100.4	
% MOD	LAST FC ± 0.004	40.1	39.2	40.0	41.1	
ID % MOD	005.0 ± 2.0	4.9	5.0	4.9	4.9	
CLEARANCE I						
COURSE DDM	0.000 ± 0.026	.008/90	.001/90	.026/90	.002/90	
WIDTH DDM	0.129 TO 0.181	.154	.155	.137	.155	
RF LEVEL	100.0 ± 10.0	100.2	99.8	103.2	99.4	
% MOD	LAST FC ± 0.004	43.6	43.4	42.1	44.7	
ID % MOD	005.0 ± 2.0	5.0	5.1	4.9	5.2	
FREQ SEP	9.5 ± 1.0	9.4	9.4	9.5	9.5	
CLEARANCE II						
COURSE DDM	0.000 ± 0.026	.008/90	.001/90	.025/90	.002/90	
WIDTH DDM	0.129 TO 0.181	.154	.155	.140	.155	
RF LEVEL	100.0 ± 10.0	100.2	100.0	102.4	99.4	
% MOD	LAST FC ± 0.004	42.2	42.5	41.3	43.9	
ID % MOD	005.0 ± 2.0	4.8	4.9	4.9	5.0	
FREQ SEP	9.5 ± 1.0	9.4	9.3	9.5	9.5	
FFM 1						
DDM	0.000 ± 0.005	.002/90	.000	.003/90	.001/90	
% MOD	40.0 ± 10.0	42.0	40.0	41.8	42.5	
FFM 2						
DDM	0.000 ± 0.005	.002/90	.000	.004/90	.001/90	
% MOD	40.0 ± 10.0	42.0	40.0	42.0	42.5	

REMARKS

AFCC FORM 938h

SSILS GLIDE SLOPE INITIAL PERFORMANCE CHECKLIST						DATE 20 February 1980
LOCATION Dyess AFB		EQUIPMENT AND SERIAL NO. AN/GRN-31 770011				TECHNICIAN TSgt Carroll

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
POWER						
COURSE CARRIER IN		3.2		3.2		
LOWER ANTENNA		.980		.980		
COURSE SBO IN		.052		.048		
MIDDLE ANTENNA		.240		.260		
CLEARANCE IN		.390		.400		
UPPER ANTENNA		.053		.054		
COURSE % MODULATION		73.91		73.91		
90Hz % MODULATION		40.84		40.84		
150Hz % MODULATION		40.84		40.84		
CLEARANCE % MOD		83.13		85.19		
COURSE POWER SUPPLY 1						
Q5 DC OUT	0.75 TO 3.5 A	1.2		1.3		
Q4 DC OUT	0.75 TO 3.5 A	1.2		1.3		
DC OUT	26.5 TO 29.5 V	28.0		28.0		
PRE REG	30 TO 38 V	35.0		35.0		
COURSE POWER SUPPLY 2						
Q9 DC OUT	0.75 TO 3.5 A	1.0		1.2		
Q10 DC OUT	0.75 TO 3.5 A	1.2		1.4		
DC OUT	26.5 TO 29.5	28.0		28.0		
PRE REG	30 TO 38 V	36.0		36.0		
COURSE TRANSMITTER						
XTAL DRIVE	0.5 MIN	2.9		1.8		
TRIPLER INPUT	0.2 TO 3.8	2.85		1.9		
EXCTR OUTPUT	0.5 TO 3.0	1.90		1.95		
EXCTR ALC	0.7 TO 3.0	2.30		2.30		
SBO DRIVER	0.2 TO 0.59	.23		.23		
CSB DRIVER	0.49 TO 1.50	.77		.95		
CSB PWR OUT	0.50 TO 3.90	2.45		2.65		
DC IN	22 TO 35	27.0		27.0		
DC IN	1.0 TO 3.0	2.5		2.5		
SBO PWR OUT	0.50 TO 4.0	2.5		1.2		
CLEARANCE TRANSMITTER						
TRIPLER INPUT	0.2 TO 3.8	2.0		2.0		
EXCTR OUTPUT	0.5 TO 3.0	1.4		1.4		
EXCTR ALC	0.7 TO 3.0	5.5		5.0		
RF AMP	LESS THAN 0.5	.3		.3		
POWER OUT	0.5 TO 3.0	1.1		1.3		

REMARKS

CHECK	SPECIFICATION	TRANSMITTER NO. 1 INITIAL	TRANSMITTER NO. 1 ADJUSTED	TRANSMITTER NO. 2 INITIAL	TRANSMITTER NO. 2 ADJUSTED	REMARKS
COURSE MONITOR 1						
TEST DDM	0.500 ± 0.020	.511		.612		
PATH (Int mon)	0.000 ± 0.050	.002/90		.002/90		
PATH (Near field)	0.000 ± 0.050	.002/150		.008/150		
WIDTH DDM	0.145 TO 0.205	.175		.173		
RF LEVEL	100.0 ± 5.0	98.3		97.4		
% MOD	LAST FC ± 4.0	77.8		77.2		
COURSE MONITOR 2						
TEST DDM	0.500 ± 0.020	.513		.513		
PATH (Int mon)	0.000 ± 0.050	.003/90		.000		
PATH (Near field)	0.000 ± 0.050	.003/150		.008/150		
WIDTH DDM	0.145 TO 0.205	.173		.172		
RF LEVEL	100.0 ± 5.0	98.2		97.4		
% MOD	LAST FC ± 4.0	79.6		79.1		
CLEARANCE MONITOR 1						
RF LEVEL	100.0 ± 5.0	113.0*		113.0*		
% MOD	90.0 ± 5.0	98.0*		102.0*		
FREQ SEP	8.00 ± 5.0	8.9		7.5		
CLEARANCE MONITOR 2						
RF LEVEL	100.0 ± 5.0	110.0*		120.3*		
% MOD	90.0 ± 5.0	98.0*		89.6*		
FREQ SEP	8.00 ± 5.0	8.8		7.7		
ALARM LIMITS						
COURSE MONITOR		MONITOR 1		MONITOR 2		
% MOD LOWER	NORMAL −004.0	74.8		75.5		
UPPER	NORMAL + 004.0	81.6		82.3		
RF LEVEL LOWER	090.0 ± 0.5	90.0		89.8		
PATH (Near) UPPER	050.0 ± 0.002	49.0		50.0		
PATH (Int) UPPER	050.0 ± 0.002	49.0		51.0		
WIDTH DDM LOWER	0.145 ± 0.002	.155*		.155*		
UPPER	0.205 ± 0.002	.195*		.195*		
TEST DDM LOWER	0.426 ± 0.040	.411		.414		
UPPER	0.557 ± 0.040	.538		.540		
CLEARANCE MONITOR ALARM LIMITS						
% MOD LOWER	07.50 ± 5.0	75.7		75.2		
RF LEVEL LOWER	090.0 ± 5.0	89.8		89.8		

REMARKS

* INDICATES OUT OF TOLERANCE

CHECK	SPECIFICATION	TRANSMITTER NO. 1		TRANSMITTER NO. 2		REMARKS
		INITIAL	ADJUSTED	INITIAL	ADJUSTED	
RADIO FREQUENCY						
COURSE	± .002%	333.806339		333.804520		
CLEARANCE	± .002%	333.797490		333.796905		
ANTENNA VSWR						
UPPER ANTENNA	< 1.2:1	1.0249:1		1.0227:1		
CENTER ANTENNA	< 1.2:1	1.0311:1		1.0304:1		
LOWER ANTENNA	< 1.2:1	1.0608:1		1.0638:1		
GROUND CHECK						
O DDM	LAST FC ± 0.010					
ABOVE PATH	LAST FC ± 0.010					
BELOW PATH	LAST FC ± 0.010					
PHASING						
GROUND CHECKPOINT	LAST FC ± 0.010					
FAR FIELD	NO SPEC					
APCU AMP AND PHASE						
		AMPLITUDE		PHASE		
C + SB DISTRIBUTION BALANCE						
SBO DISTRIBUTION BALANCE MID TO LOWER						
SBO DISTRIBUTION BALANCE MID TO UPPER						
CLEARANCE DISTRIBUTION BALANCE						

TITLE:

GLIDE SLOPE FAR FIELD PHASING CHECKS

LOCATION: Dyess AFB

DATE: February 1980

POSITION ON AIRFIELD	PROCEDURE ONE		PROCEDURE TWO	
	UPPER TO MIDDLE	LOWER TC UPPER & MIDDLE	LOWER TO MIDDLE	LOWER TO UPPER
20 DEGREE GROUND CHECK POINT	.240/90	.042/90	.140/90	.275/150
OLD LOCALIZER MONITOR PAD	.007/90	.010/90	.075/90	.047/90
FAR FIELD MONITOR	.007/90	.085/150	.035/90	.032/150

REMARKS

TRANSMITTER ONE

SSILS G/S PRE-POST AIRBORNE EVALUATION CHECKLIST						DATE 22 February 1980
CHECK	SPECIFICATION	TRANSMITTER 1 PRE	TRANSMITTER 1 POST	TRANSMITTER 2 PRE	TRANSMITTER 2 POST	REMARKS
UPPER ANTENNA POWER			65mW		65mW	
CENTER ANTENNA POWER			275mW		300mW	
LOWER ANTENNA POWER			1.5 W		1.5 W	
COURSE % MODULATION			80%		80%	
CLEARANCE % MODULATION			88%		90%	
MONITORS COURSE I						
PATH (*INT*)	0.000 ± 0.050		.002/90		.005/150	
PATH (*NF*)	0.000 ± 0.050		.008/90		.002/90	
WIDTH DDM	0.145 TO 0.205		.177		.175	
RF LEVEL	100.0 ± 10.0		102.3		104.3	
% MOD	LAST FC ± 4.0		78.2		78.5	
COURSE II						
PATH (*INT*)	0.000 ± 0.050		.003/90		.005/150	
PATH (*NF*)	0.000 ± 0.050		.008/90		.001/90	
WIDTH DDM	0.145 TO 0.205		.176		.173	
RF LEVEL	100.0 ± 10.0		102.3		104.4	
% MOD	LAST FC ± 4.0		80.0		80.2	
CLEARANCE I						
RF LEVEL	100.0 ± 5.0		100.0		99.3	
% MOD	90.0 ± 5.0		87.0		95.0	
FREQ SEP	8.00 ± 5.0		9.0		7.8	
CLEARANCE II						
RF LEVEL	100.0 ± 5.0		96.8		99.5	
% MOD	90.0 ± 5.0		93.8		95.8	
FREQ SEP	8.00 ± 5.0		9.0		7.8	

REMARKS

AFCC FORM JAN 80 939b

FLIGHT INSPECTION REPORT—INSTRUMENT LANDING SYSTEM

Reports Identification Symbol FS8071-19

1. STATION	2. IDENT.	3. DATE/DATES OF INSPECTION
Dyess AFB, TX RWY 16	TYY	12-13 Feb 80

4. TYPE OF INSPECTION

	SITE EVALUATION		PERIODIC	X	SPECIAL TRACALS
	COMMISSIONING		SURVEILLANCE		INCOMPLETE

5. COMMON SYSTEM

	YES
X	NO

6. OWNER

	FAA		U.S. ARMY	PRIVATE *(Indicate actual owner)*
			U.S. NAVY	
	INTER-NATIONAL	X	U.S.A.F.	OTHER *(Indicate actual owner)*
			U.S.C.G.	

7. FACILITY/COMPONENT INSPECTED

X	LOCALIZER		COMPASS LOCATORS	X	75 MHz MARKERS
	GLIDE SLOPE		DME		LIGHTING SYSTEM

8. LOCALIZER

COMMISSIONED WIDTH 3.00 — CATEGORY I

Front Course TX 1 OT	TX 1 INIT.	TX 1 FINAL	TX 2 OT	TX 2 INIT.	TX 2 FINAL		Back Course TX 1 OT	TX 1 INIT.	TX 1 FINAL	TX 2 OT	TX 2 INIT.	TX 2 FINAL
	3.00	3.00		3.10	3.00	COURSE WIDTH						
	19.4	19.8			19.9	MODULATION						
		230/28			315/8	CLEARANCE 150						
		250/18			255/18	CLEARANCE 90						
		0			8/5.5	COURSE STRUCTURE—Z1						
		2/0.7			6/1.4	COURSE STRUCTURE—Z2						
		3/0.5			6/0.2	COURSE STRUCTURE—Z3						
		C/L			C/L	ALIGNMENT						
						VOICE						
		S			S	IDENTIFICATION						
		18			18	USABLE DISTANCE						
						MONITOR						
C	2.45	2.50			2.65	COURSE WIDTH *(Narrow)*						
		3.30			3.45	COURSE WIDTH *(Wide)*						
		280/28			270/28	CLEARANCE 150						
		245/6			255/6	CLEARANCE 90						
		10			9	ALIGNMENT 150						
		10			10	ALIGNMENT 90						

9. GLIDE SLOPE

TX 1 OT	TX 1 INIT.	TX 1 FINAL	TX 2 OT	TX 2 INIT.	TX 2 FINAL	
						COM'D ANGLE
						CATEGORY
						MODULATION
						ANGLE
						WIDTH
						CLEARANCE BELOW PATH
						STRUCTURE BELOW PATH
						PATH STRUCTURE—Z1
						PATH STRUCTURE—Z2
						PATH STRUCTURE—Z3
						USABLE DISTANCE
						MONITOR
						ANGLE *(Low)*
						ANGLE *(High)*
						PATH WIDTH *(Wide)*
						CLEARANCE BELOW PATH

10. GENERAL

	SAT	UNSAT
75 MHz MARKERS	X	
COMPASS LOCATORS		
DME	X	
LIGHTING SYSTEMS	X	

11. FACILITY STATUS

	F/C	G/S	B/C
UNRESTRICTED	X		
RESTRICTED			
UNUSABLE			

NOTAM:

12 REMARKS

1. This was a special TRACALS Evaluation of a GRN-29 capture effect localizer. Discrepancy classification not applicable. Periodic requirements met.
2. Symmetry: TX 1 = 47% 50; TX 2 = 50/50.
3. VP: TX 1 = 0, TX 2 = 0.
4. High angle clearance was checked and found satisfactory.

REGION	FIELD OFFICE	FLIGHT INSPECTOR'S SIGNATURE
	1866 FCS	CARL D. GUSTAFSON, Capt, USAF

FAA Form 8240-7 (5-76) FORMERLY FAA FORM 3488

FLIGHT INSPECTION REPORT – CONTINUATION SHEET

1. STATION	2. LOCATION IDENT.	3. FACILITY TYPE	4. DATE/DATES OF INSPECTION
Dyess AFB, TX RWY 16	TYY	GRN 29 Localizer	12-13 Feb 80

5. Monitor Dephase Checks:

	COURSE	CLEARANCE	
	ADV/RET	ADV/RET	CW
TX#1	18°		3.30
	20°		3.15
		27°	3.00
		22°	3.00
TX#2	17°		3.30
	20°		3.05
		25°	3.05
		16°	3.05

6. RFI checks were performed by flying the on-air RWY Localizer while flying over the opposite, dummy-loaded localizer, out-of-tolerance structure was found on both localizers when flying over the dummy-loaded localizers.

7. Course width and clearance runs were flown over the A31 VORTAC due to restricted visibility.

8. Mr F. Gilkes, FAA FSNFO, notified 13 Feb 80 at 2310Z.

FLIGHT INSPECTION REPORT—INSTRUMENT LANDING SYSTEM

Reports Identification Symbol FS8071-19

1. STATION	2. IDENT.	3. DATE/DATES OF INSPECTION
Dyess AFB, TX RWY 16	TYY	20,22-23 Feb 1980

4. TYPE OF INSPECTION

	SITE EVALUATION		PERIODIC	X	SPECIAL TRACALS RC		YES
	COMMISSIONING		SURVEILLANCE		INCOMPLETE	X	NO

5. COMMON SYSTEM (see above: YES / NO)

6. OWNER

	FAA		U.S. ARMY	PRIVATE *(Indicate actual owner)*
			U.S. NAVY	
	INTERNATIONAL	X	U.S.A.F.	OTHER *(Indicate actual owner)*
			U.S.C.G.	

7. FACILITY/COMPONENT INSPECTED

	LOCALIZER		COMPASS LOCATORS		75 MHz MARKERS
X	GLIDE SLOPE		DME		LIGHTING SYSTEM

8. LOCALIZER

COMMISSIONED WIDTH______

FRONT COURSE TX 1 OT	INIT.	FINAL	TX 2 OT	INIT.	FINAL	CATEGORY	BACK COURSE TX 1 OT	INIT.	FINAL	TX 2 OT	INIT.	FINAL
						COURSE WIDTH						
						MODULATION						
						CLEARANCE 150						
						CLEARANCE 90						
						COURSE STRUCTURE—Z1						
						COURSE STRUCTURE—Z2						
						COURSE STRUCTURE—Z3						
						ALIGNMENT						
						VOICE						
						IDENTIFICATION						
						USABLE DISTANCE						
						MONITOR						
						COURSE WIDTH *(Narrow)*						
						COURSE WIDTH *(Wide)*						
						CLEARANCE 150						
						CLEARANCE 90						
						ALIGNMENT 150						
						ALIGNMENT 90						

9. GLIDE SLOPE

TX 1 OT	INIT.	FINAL	TX 2 OT	INIT.	FINAL	COM'D ANGLE 2.60
						CATEGORY I
		80.0			80.0	MODULATION
		2.60			2.57	ANGLE
		.70			.71	WIDTH
		S			S	CLEARANCE BELOW PATH
		1.77			1.78	STRUCTURE BELOW PATH
		2/7.0			2/6.0	PATH STRUCTURE—Z1
		15/1.0			17/0.6	PATH STRUCTURE—Z2
		11/0.3			7/0.3	PATH STRUCTURE—Z3
		10			10	USABLE DISTANCE
						MONITOR
						ANGLE *(Low)*
						ANGLE *(High)*
						PATH WIDTH *(Wide)*
		S			S	CLEARANCE BELOW PATH

10. GENERAL

	SAT	UNSAT
75 MHz MARKERS		
COMPASS LOCATORS		
DME		
LIGHTING SYSTEMS		

11. FACILITY STATUS

	F/C	G/S	B/C
UNRESTRICTED			
RESTRICTED		X	
UNUSABLE			

NOTAM:

SEE REMARK #6.

12. REMARKS

1. This was a TRACALS Evaluation of RWY 16 glideslope. Numerous equipment adjustments were made prior to the flight inspection; discrepancy classification not applicable.
2. Phase verification completed on both transmitters.
3. Angles at localizer extremities were 2.62 90Hz, 2.82 150Hz.
4. Items 5E and 5F were combined.

REGION	FIELD OFFICE	FLIGHT INSPECTOR'S SIGNATURE
	1866 FCS	DON S. ORTH, Capt, USAF Don S. Orth

FAA Form 8240-7 (5-76) FORMERLY FAA FORM 3488

FLIGHT INSPECTION REPORT—INSTRUMENT LAND... SYSTEM
SUPPLEMENT SHEET

1. STATION	2. IDENT.	3. DATE/DATES OF INSPECTION
Dyess AFB, TX RWY 16	TYY	20,22,23 Feb 1980

4. LOCALIZER

	TX-1		TX-2	
4a. VERTICAL POLARIZATION	ua		ua	
4b. SYMMETRY	% 90 Hz	% 150 Hz	% 90 Hz	% 150 Hz

5. GLIDE PATH

		PATH ANGLE		PATH WIDTH		STRUCTURE BELOW PATH	
		TX-1	TX-2	TX-1	TX-2	TX-1	TX-2
5a. DEPHASE	16/20.5 ° ADVANCE	2.65	2.64	.90	.81	1.42	1.38
	22/18 ° RETARD	2.68	2.67	.63	.73	1.58	1.50
5b. PATH ANGLE LOWERED TO ALARM							
5c. PATH ANGLE RAISED TO ALARM							
5d. PATH WIDTH NARROWED TO ALARM		2.67	2.64	.57	.54		
5e. PATH WIDTH WIDENED TO ALARM		2.67	2.63	.85	.79	1.71	1.73
5f. CLEARANCE TX MODULATION DECREASED TO ALARM							
5g. ATTENUATE MIDDLE ANT. TO ALARM		2.67	2.61	.82	.77	1.59	1.56
5h. ATTENUATE UPPER ANT. TO ALARM		2.62	2.64	.68	.66	1.74	1.76

	TX-1		TX-2	
5i. SYMMETRY →	46 % 90 Hz	54 % 150 Hz	48 % 90 Hz	52 % 150 Hz
5j. MODULATION BALANCE →	TX-1 0ua		TX-2 0ua	
5k. PHASING →	TX-1		TX-2	
5l. FRONT COURSE AREA WHERE PHASING CONDUCTED →			°	Hz SIDE
5m. STRUCTURE BELOW PATH—CAPTURE EFFECT *(Special procedures)* →			TX-1 S	TX-2 S

6. REMARKS

'tructure below path-capture effect special procedures was unsatisfactory in the [illegible] wing conditions. TX1, middle antenna advanced to alarm, TX2, middle antenna [illegible]ced to alarm, middle antenna attenuated to alarm, middle antenna retarded to

[illegible] tricted for autopilot coupled approaches below 1955'MSL. Restriction [illegible] reversals in zone 3.

[illegible] structure and angle. Angle reported as actual angle from RTT.

[illegible]tified 25 2230Z Feb 80.

TITLE:

LOCALIZER FLIGHT INSPECTION GRAPH

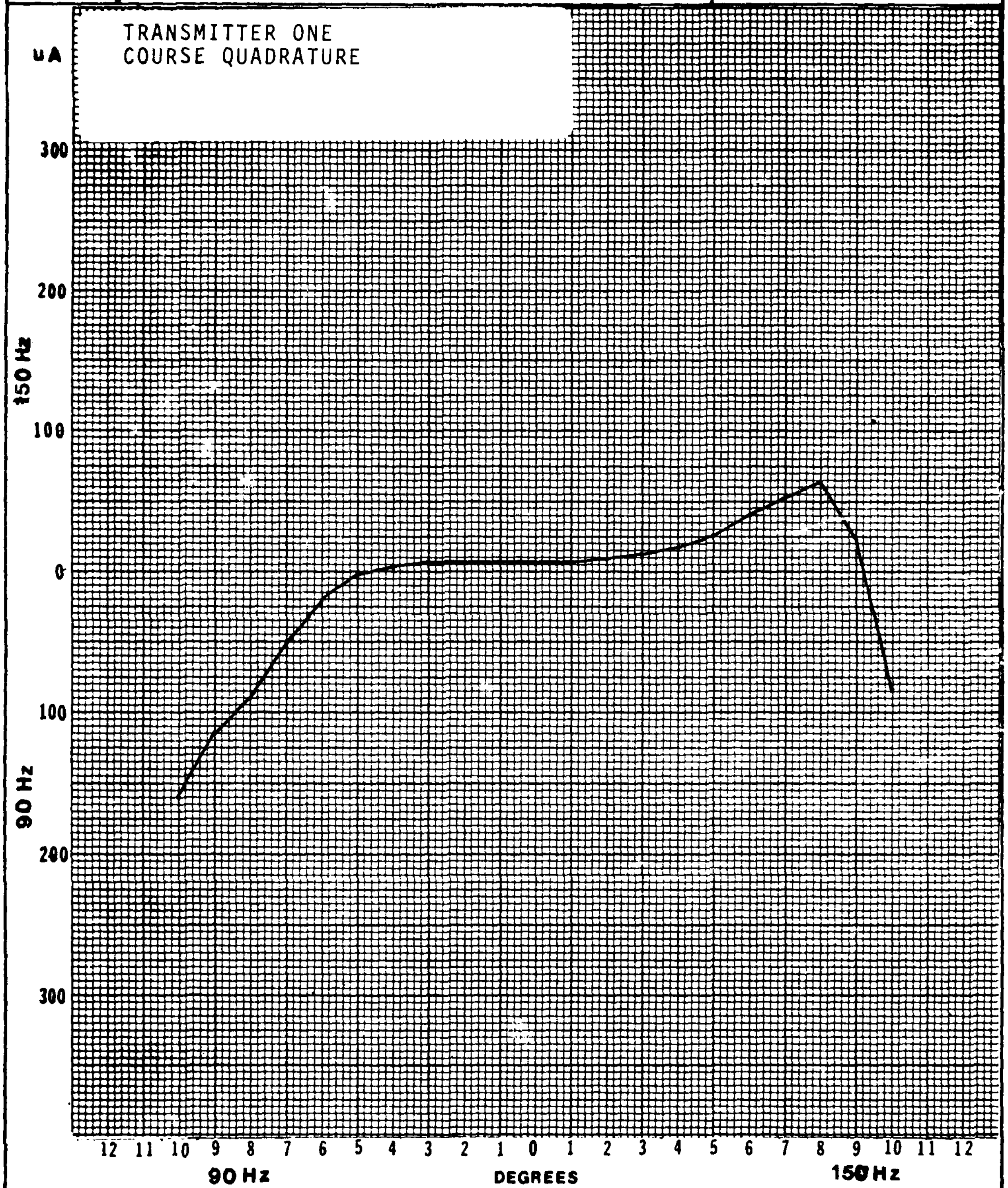
LOCATION Dyess AFB

DATE 12 February 1980

TITLE:

LOCALIZER FLIGHT INSPECTION GRAPH

LOCATION	DATE
Dyess AFB	12 February 1980



REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

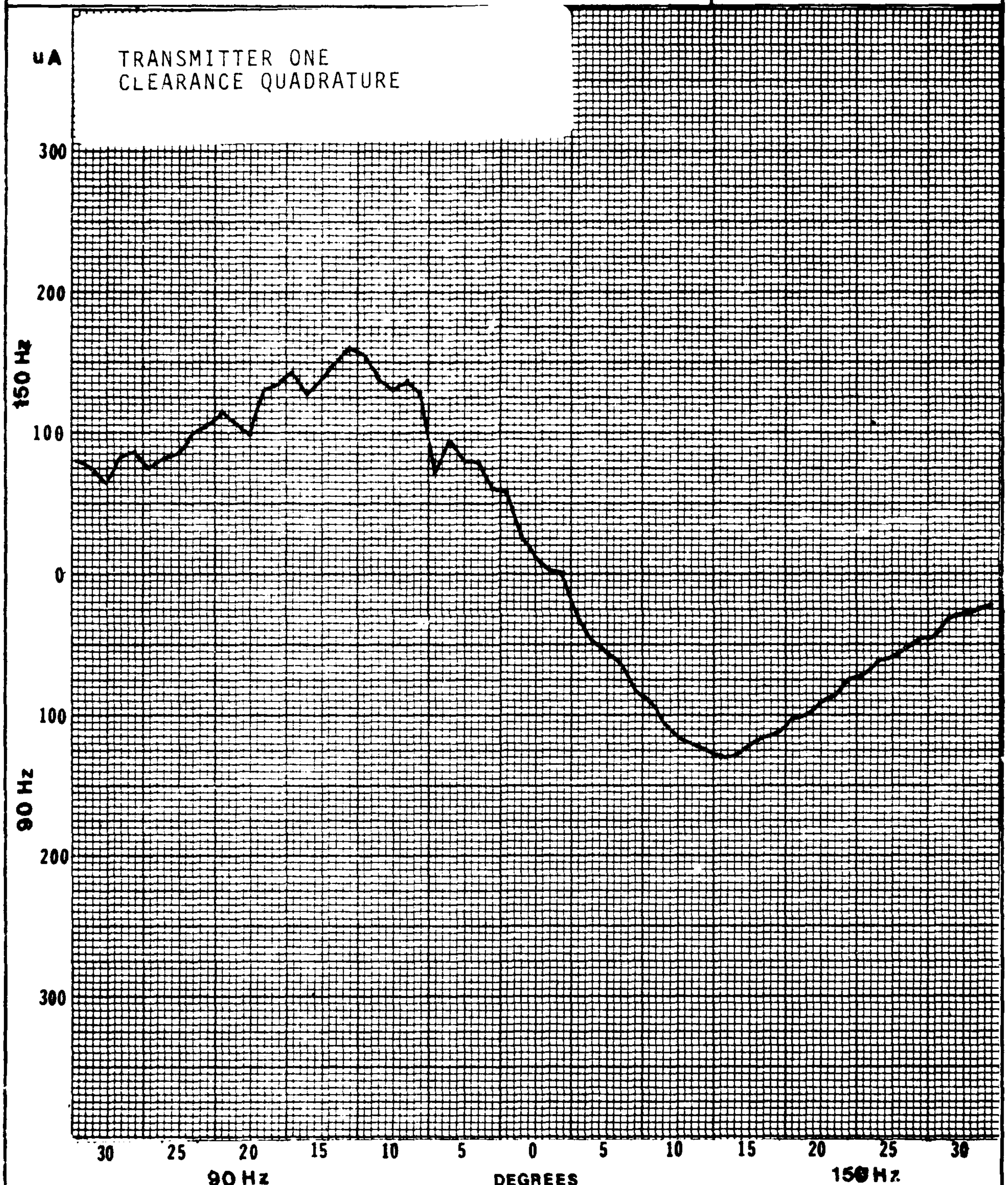
LOCALIZER FLIGHT INSPECTION GRAPH

LOCATION

Dyess AFB

DATE

12 February 1980



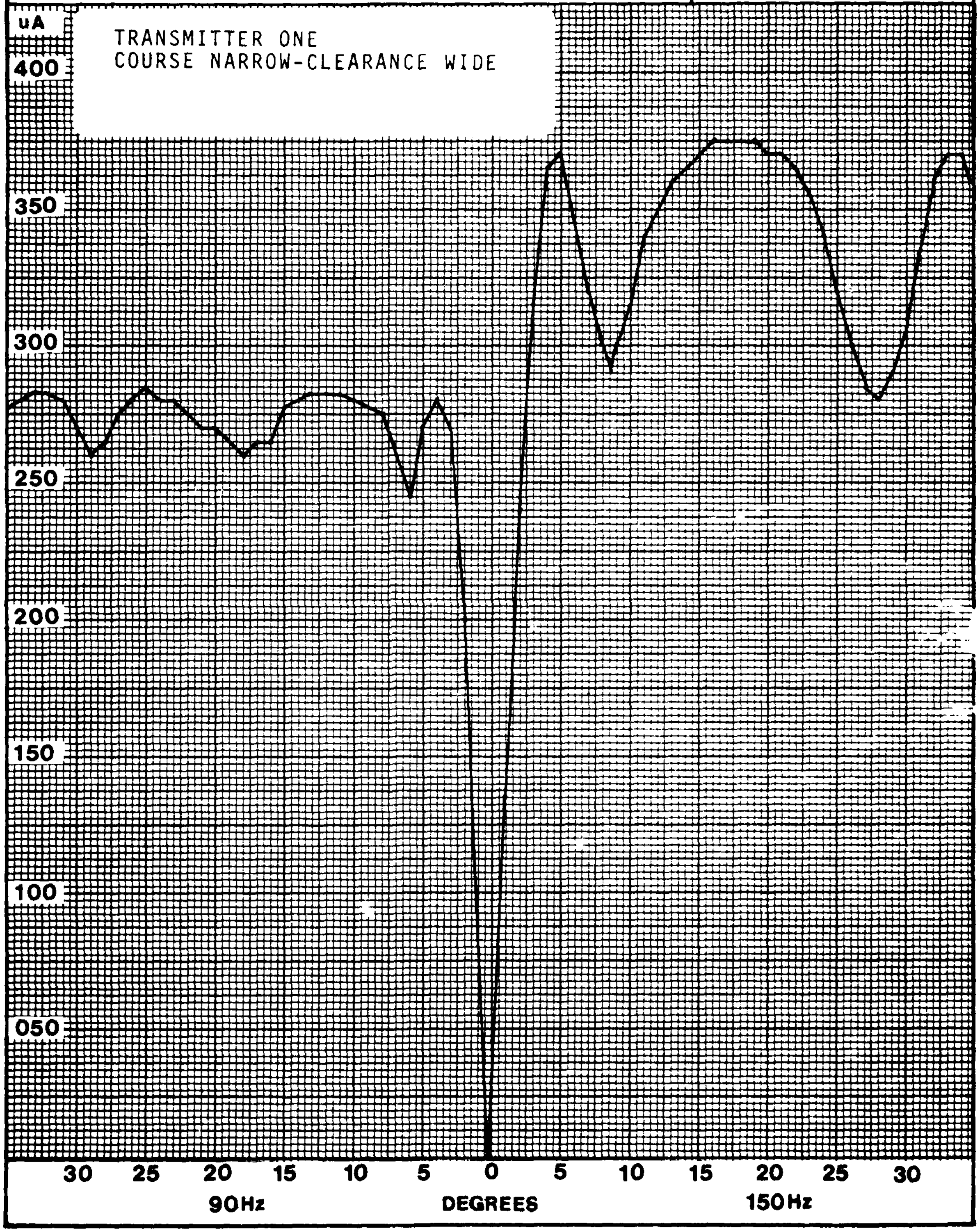
REMARKS

AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

LOCALIZER FLIGHT INSPECTION GRAPH

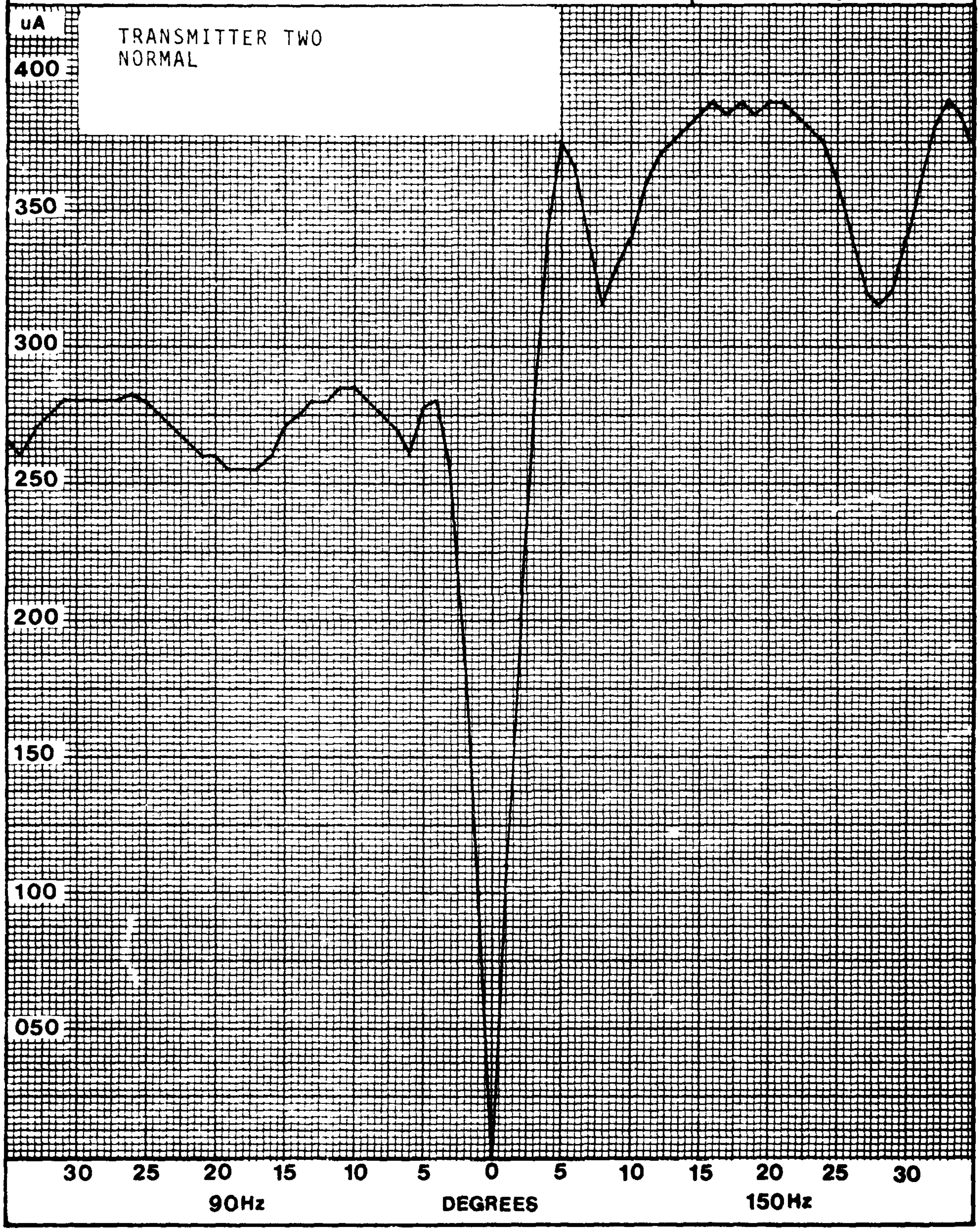
LOCATION	DATE
Dyess AFB	12 February 1980



TITLE:

LOCALIZER FLIGHT INSPECTION GRAPH

LOCATION	DATE
Dyess AFB	13 February 1980



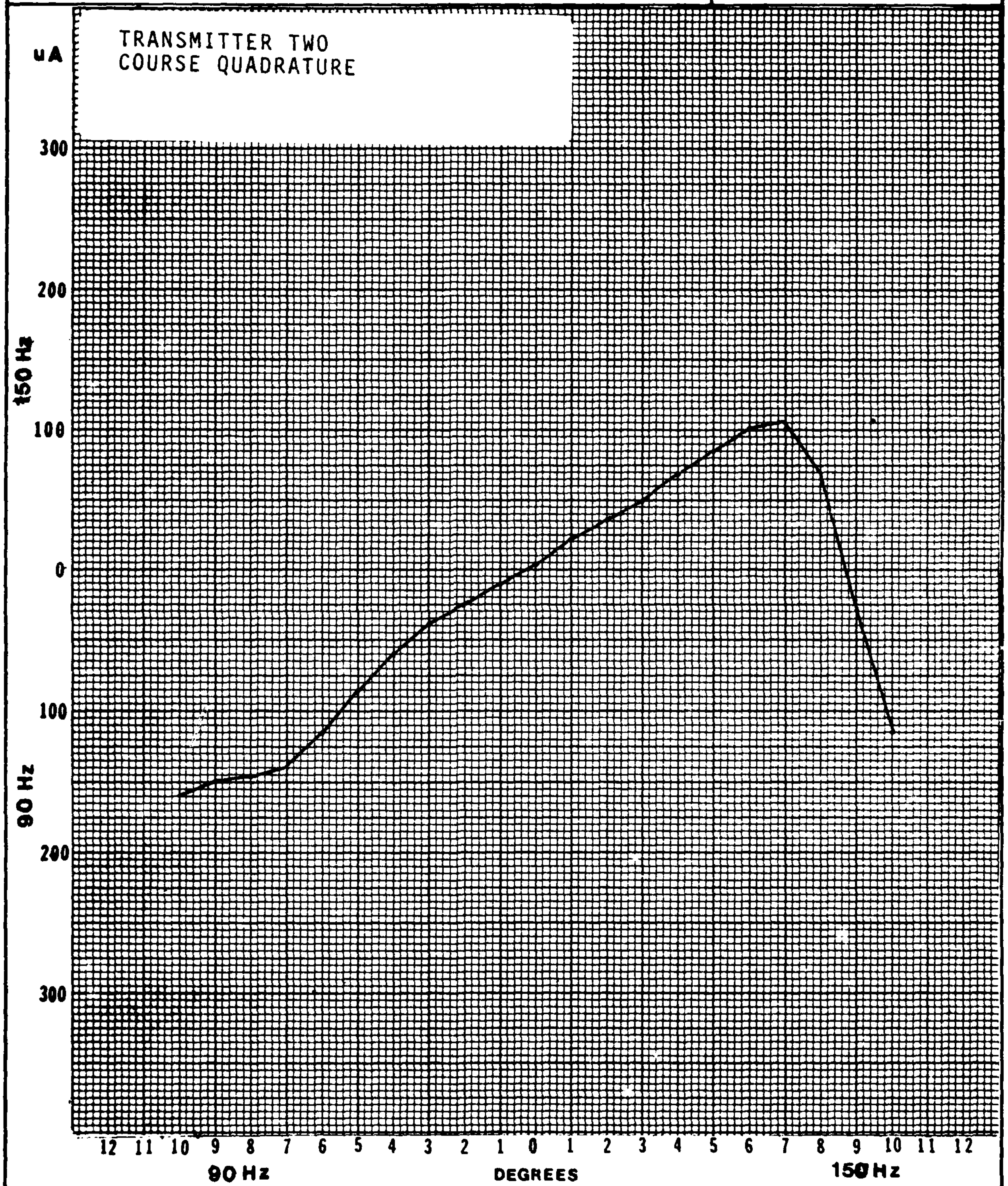
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE:

LOCALIZER FLIGHT INSPECTION GRAPH

LOCATION: Dyess AFB

DATE: 13 February 1980

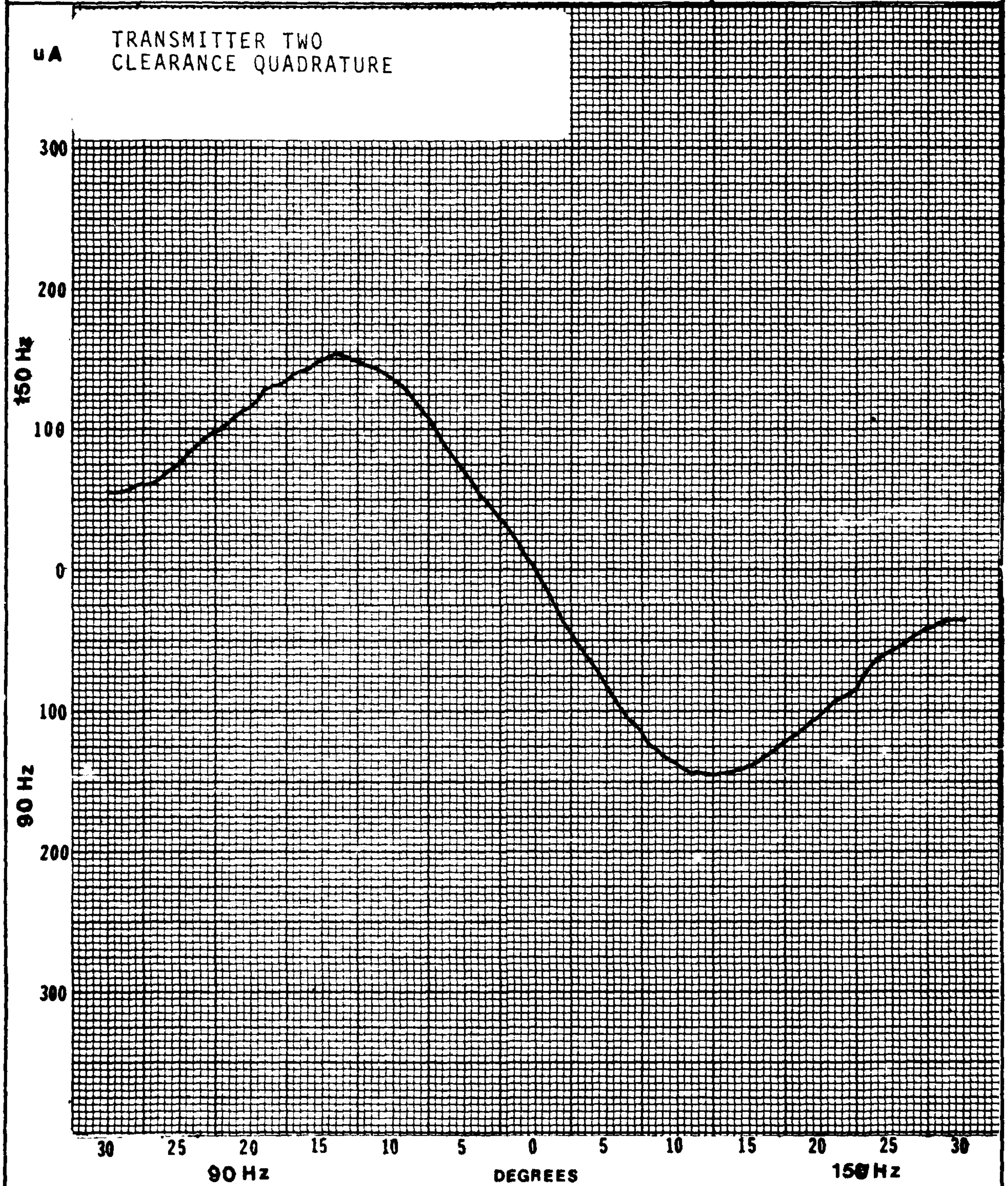


REMARKS

TITLE:

LOCALIZER FLIGHT INSPECTION GRAPH

LOCATION	DATE
Dyess AFB	13 February 1980



REMARKS

TITLE:

LOCALIZER FLIGHT INSPECTION GRAPH

LOCATION

Dyess AFB

DATE

13 February 1980

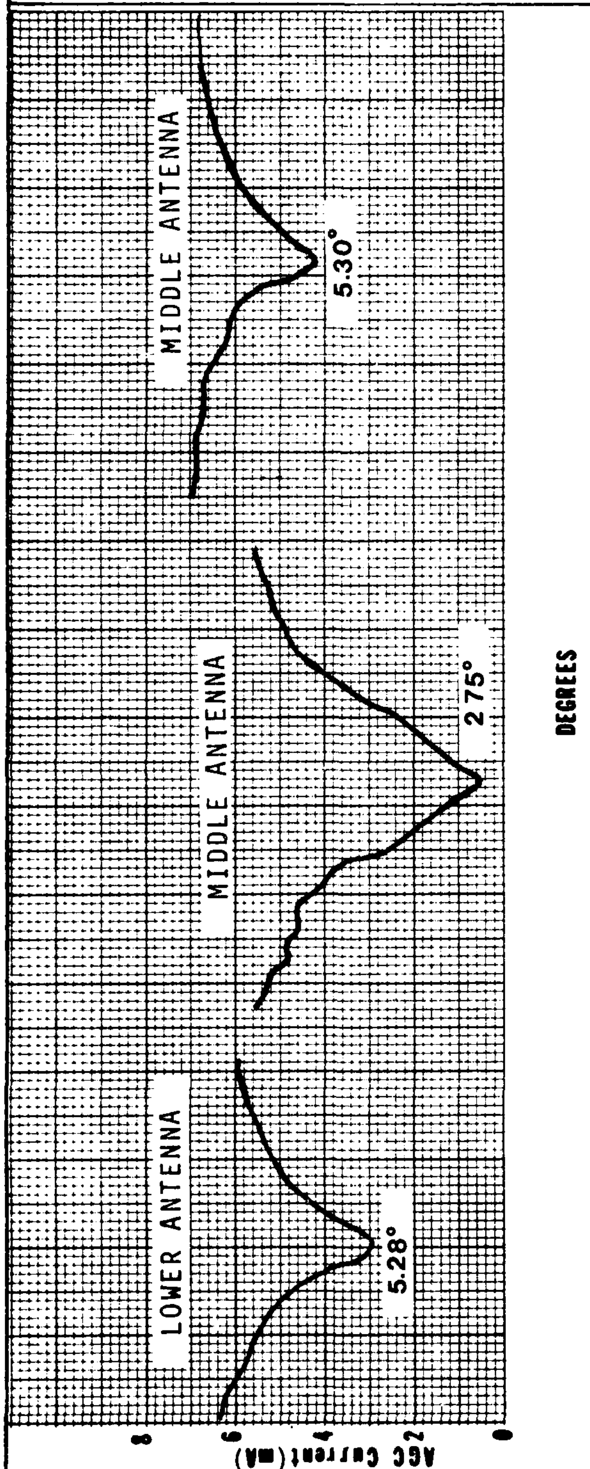
AFCS FORM MAY 73 906 GENERAL INFORMATION

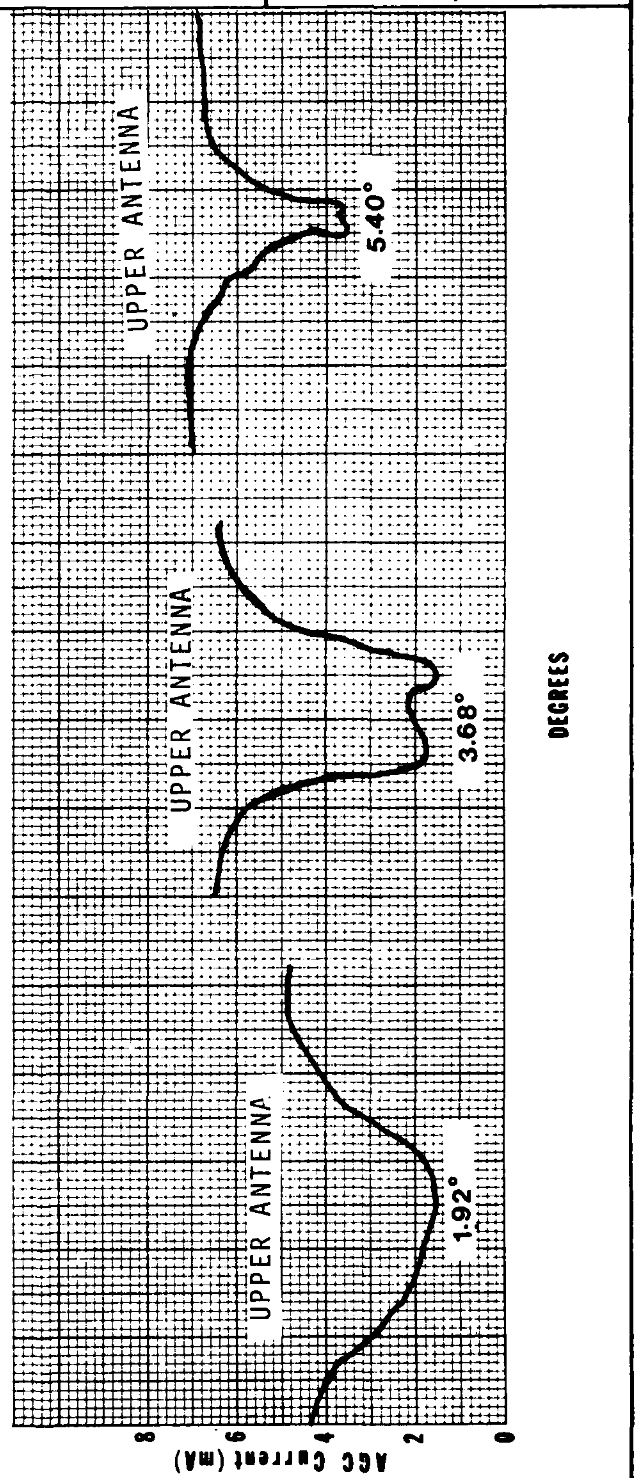
TITLE:

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION: Dyess AFB

DATE: 22 February 1980





REMARKS

ANTENNA NULL CHECKS BEFORE ANTENNA ADJUSTMENTS

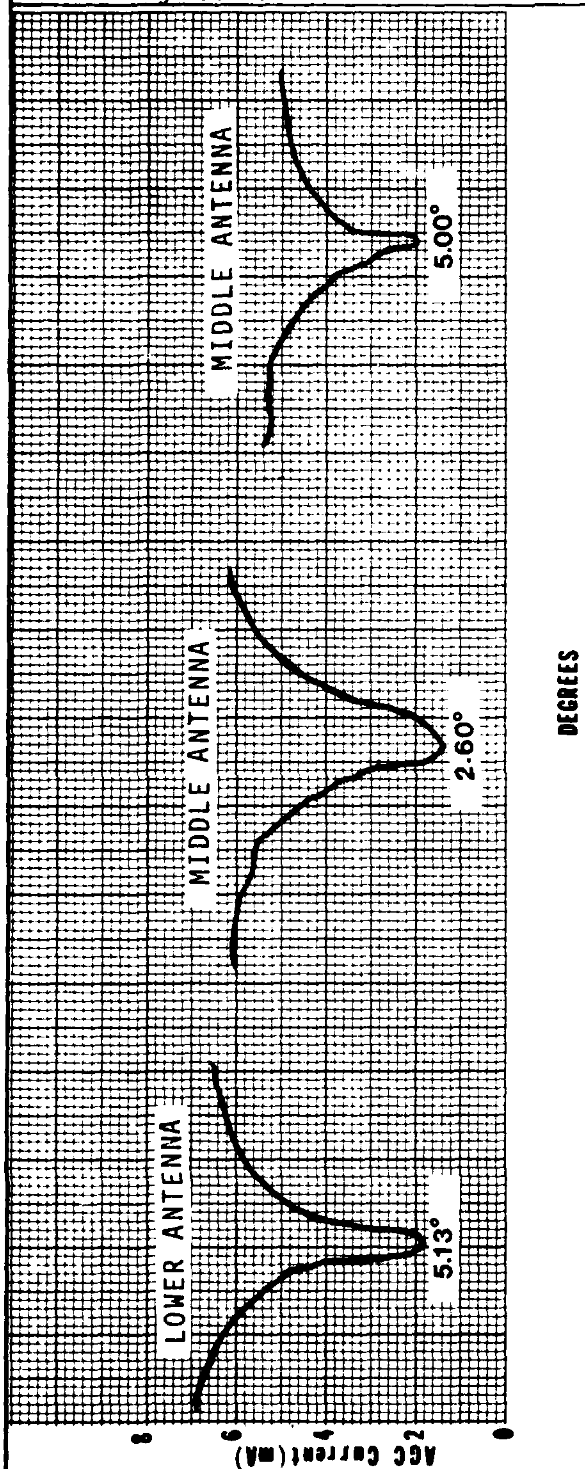
Attachment 15

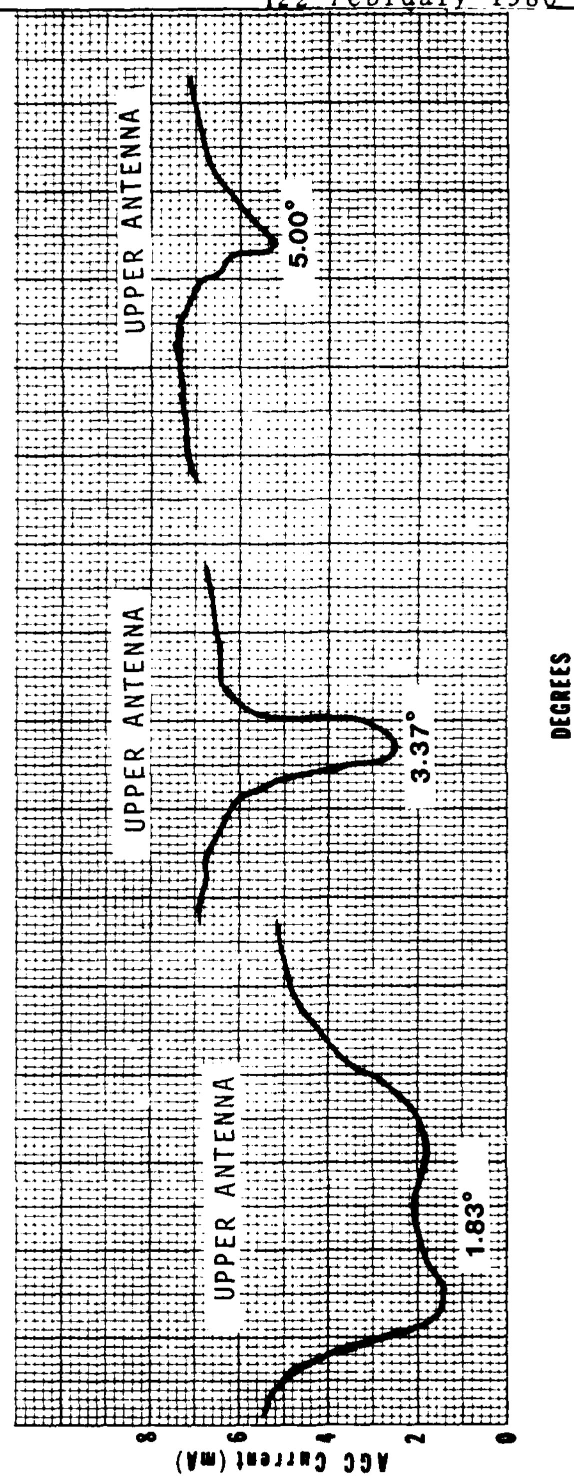
TITLE:

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION: Dyess AFB

DATE: 22 February 1980





REMARKS

ANTENNA NULL CHECKS AFTER ANTENNA ADJUSTMENT

TITLE

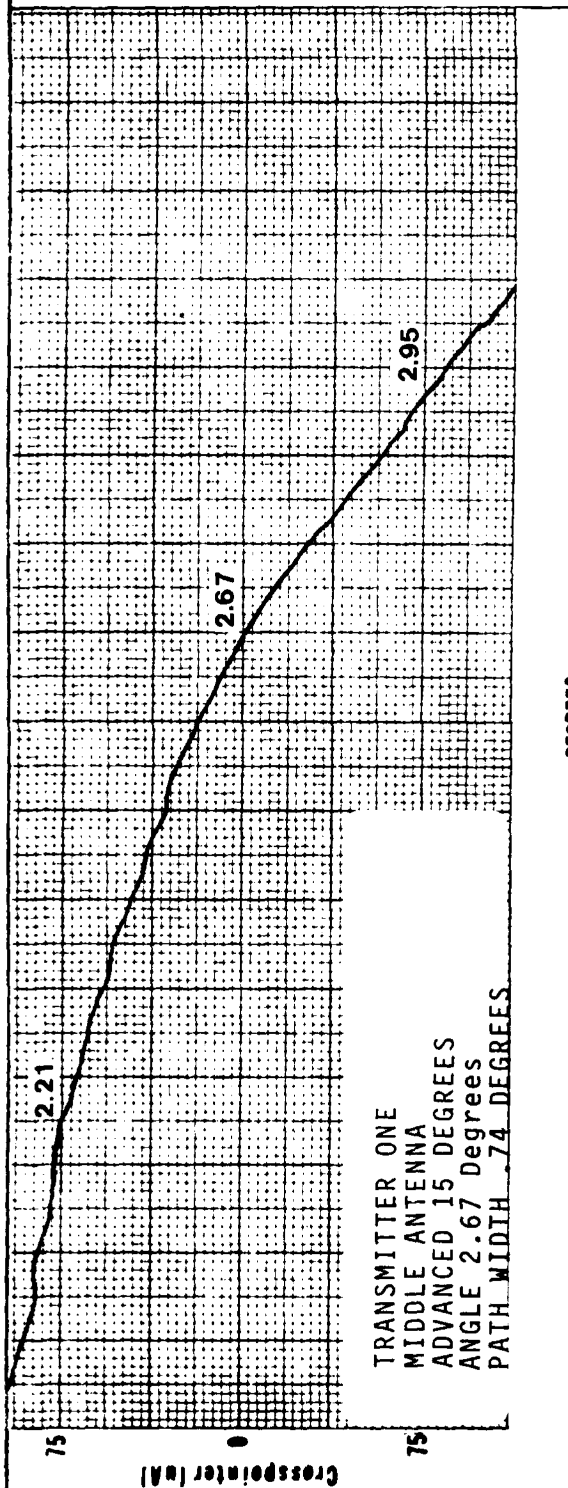
GLIDE SLOPE FLIGHT INSPECTION GRAPHS

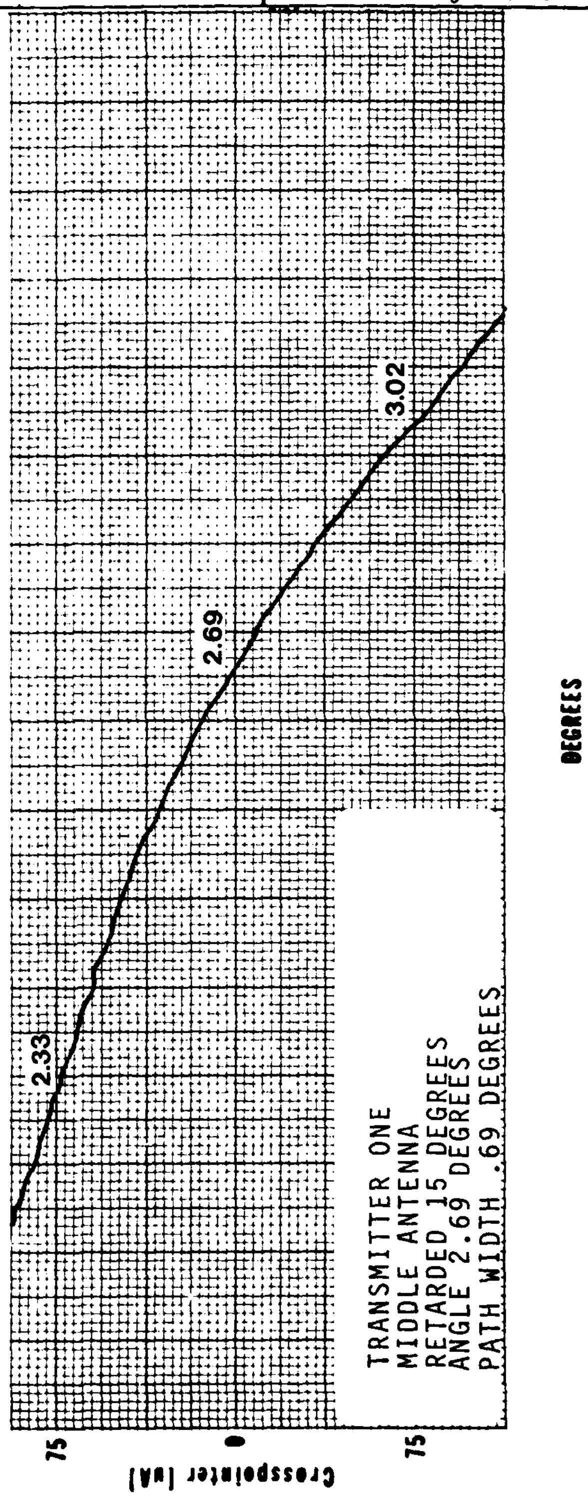
LOCATION

Dyess AFB

DATE

22 February 1980



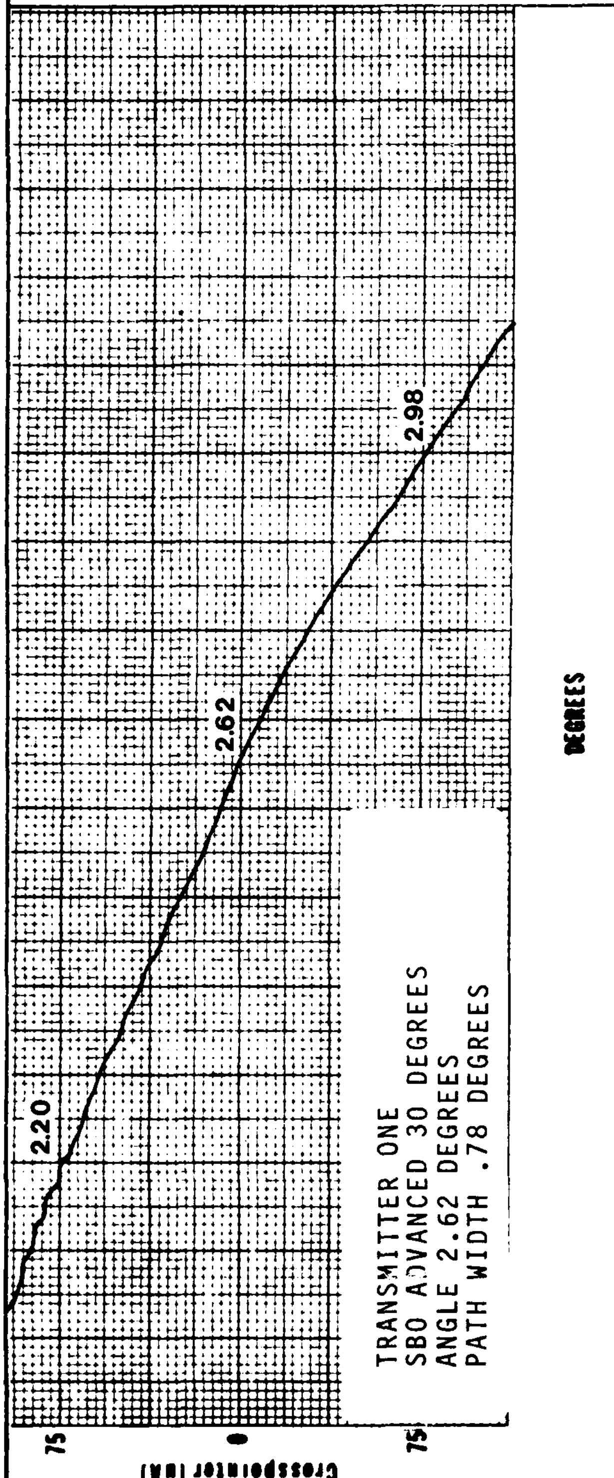


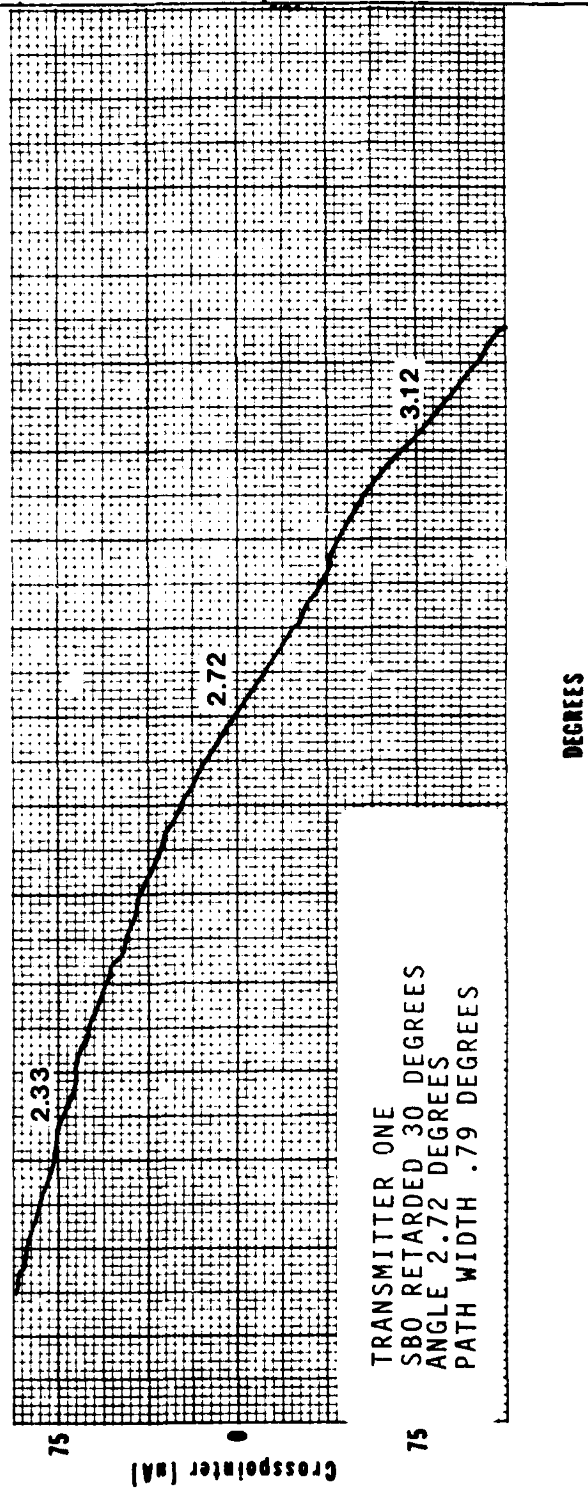
REMARKS

TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION	DATE
Dyess AFB	22 February 1980



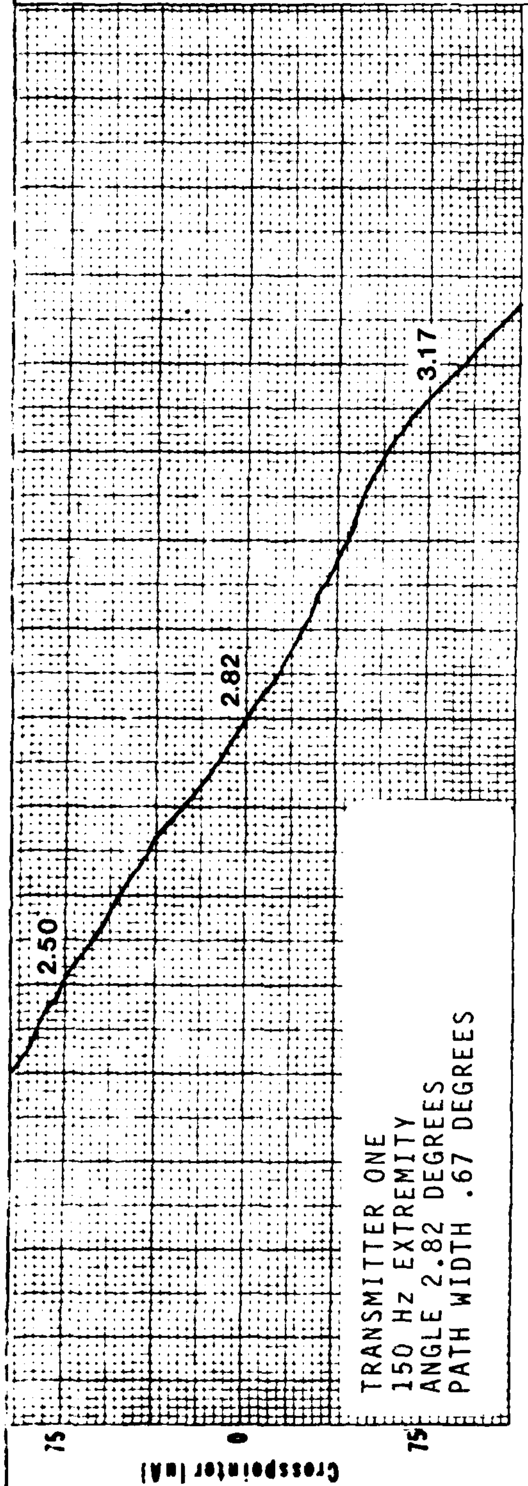


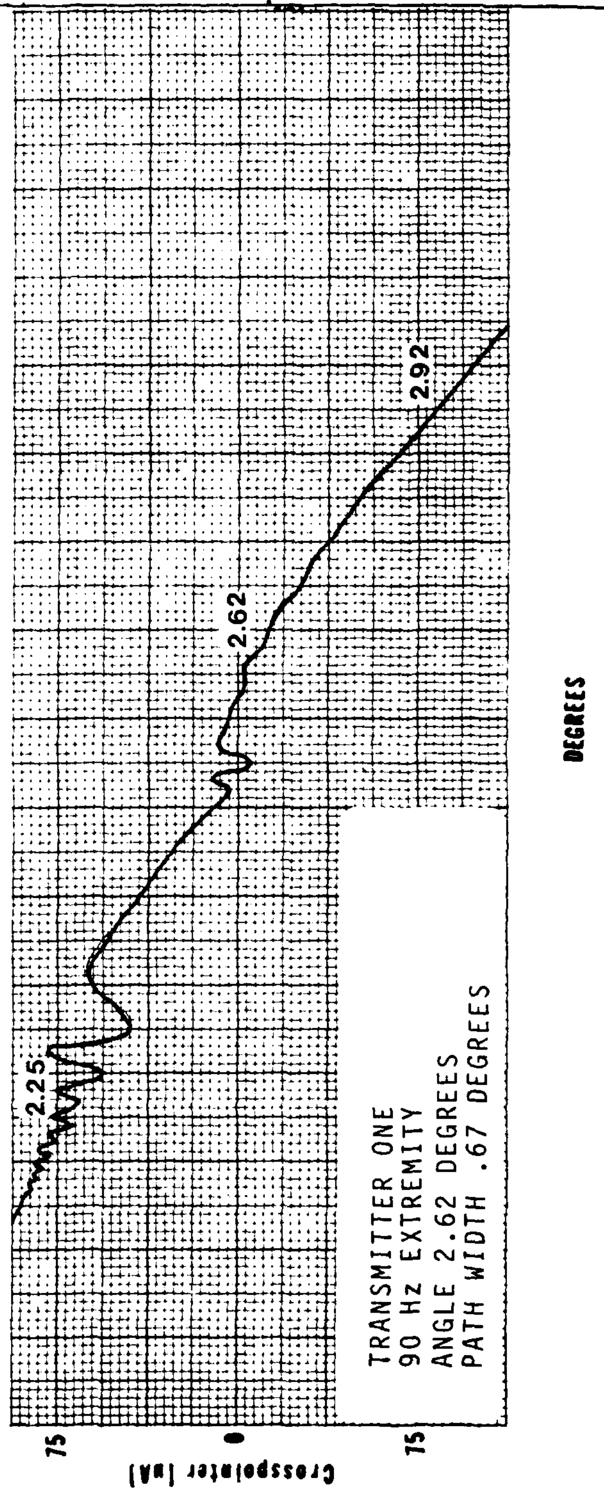
REMARKS

TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION	DATE
Dyess AFB	22 February 1980





REMARKS

AD-A086 510 FACILITY CHECKING SQUADRON (1866TH) (AFCS) SCOTT AFB IL F/G 17/7
TRACALS EVALUATION REPORT. SSILS INITIAL EVALUATION REPORT, AN/--ETC(U)
JUN 80 J P COYLE, D E THIBODEAU
UNCLASSIFIED 80/66N-202 NL

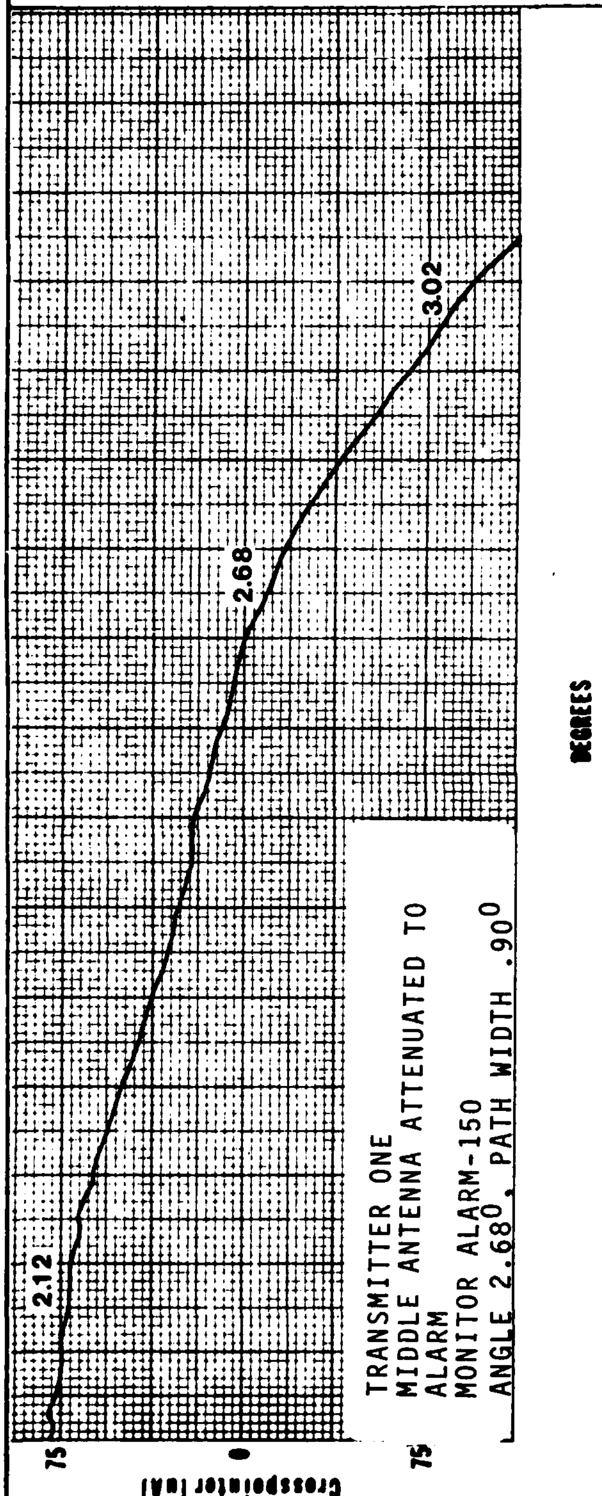
2 OF 2
AD
AD-A086510

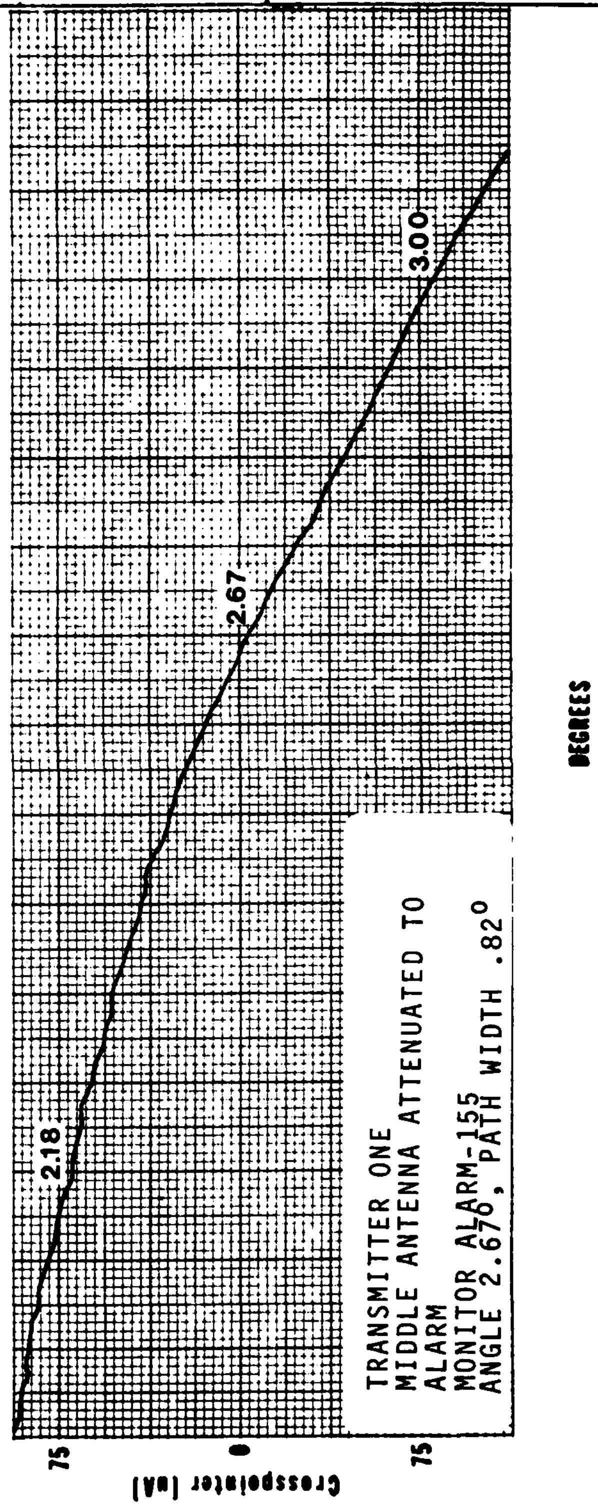
END
DATE FILMED
8-80
DTIC

TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION	DATE
Dyess AFB	22 February 1980



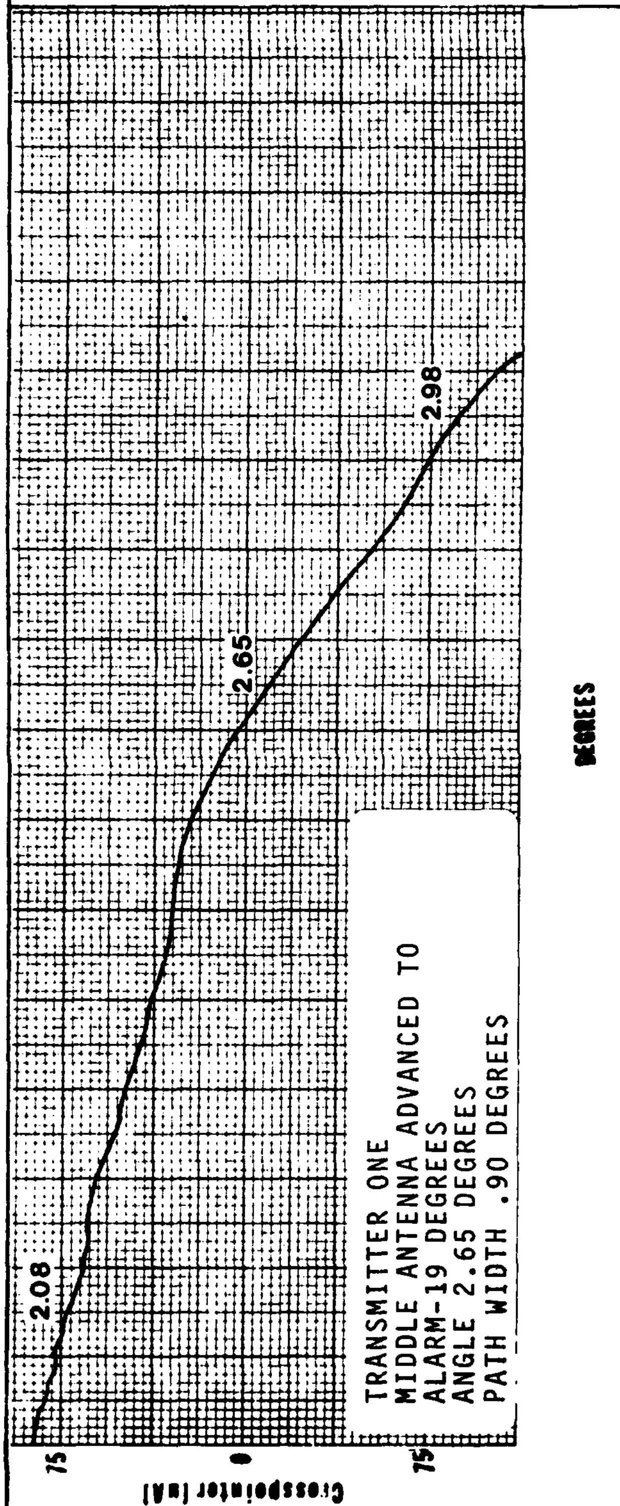


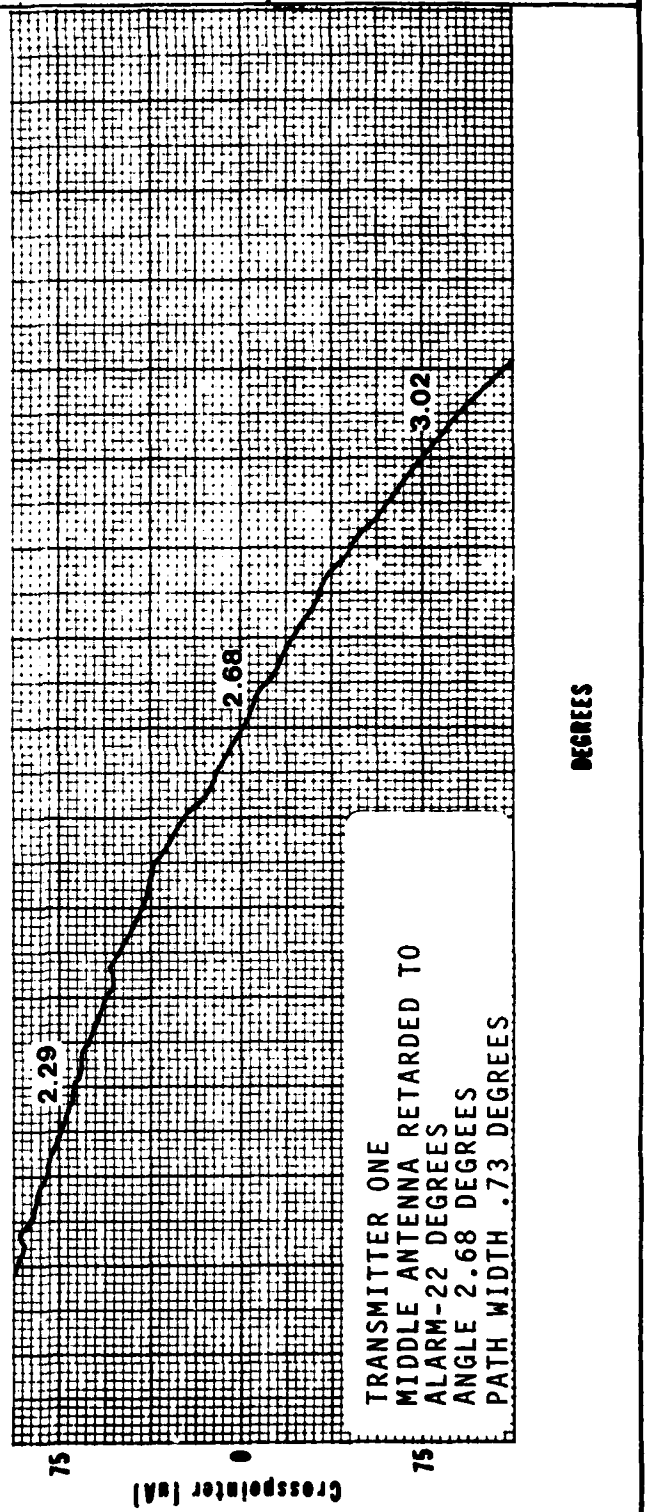
REMARKS

TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION Dyess AFB DATE 23 February 1980





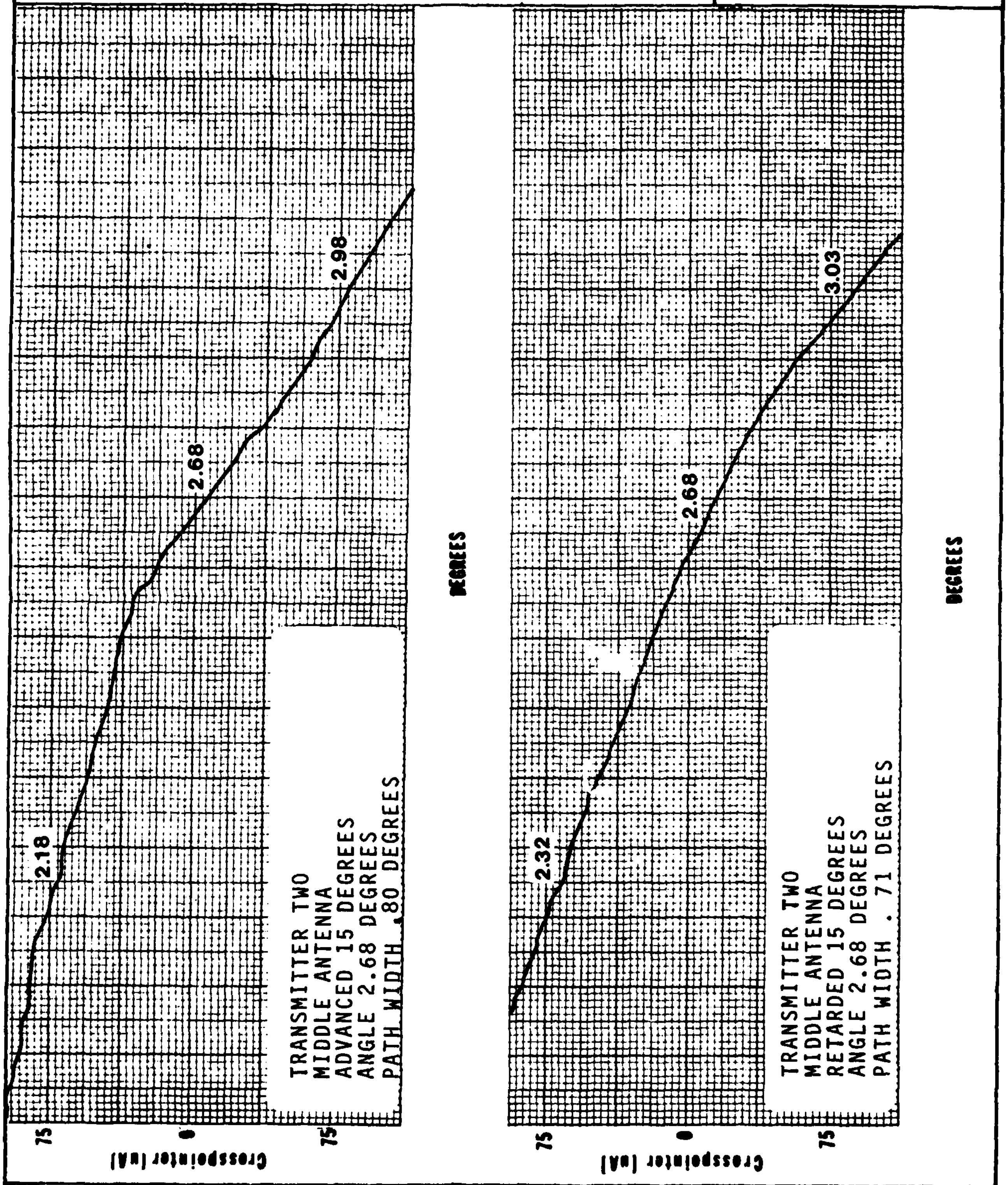
REMARKS

TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION Dyess AFB

DATE 23 February 1980



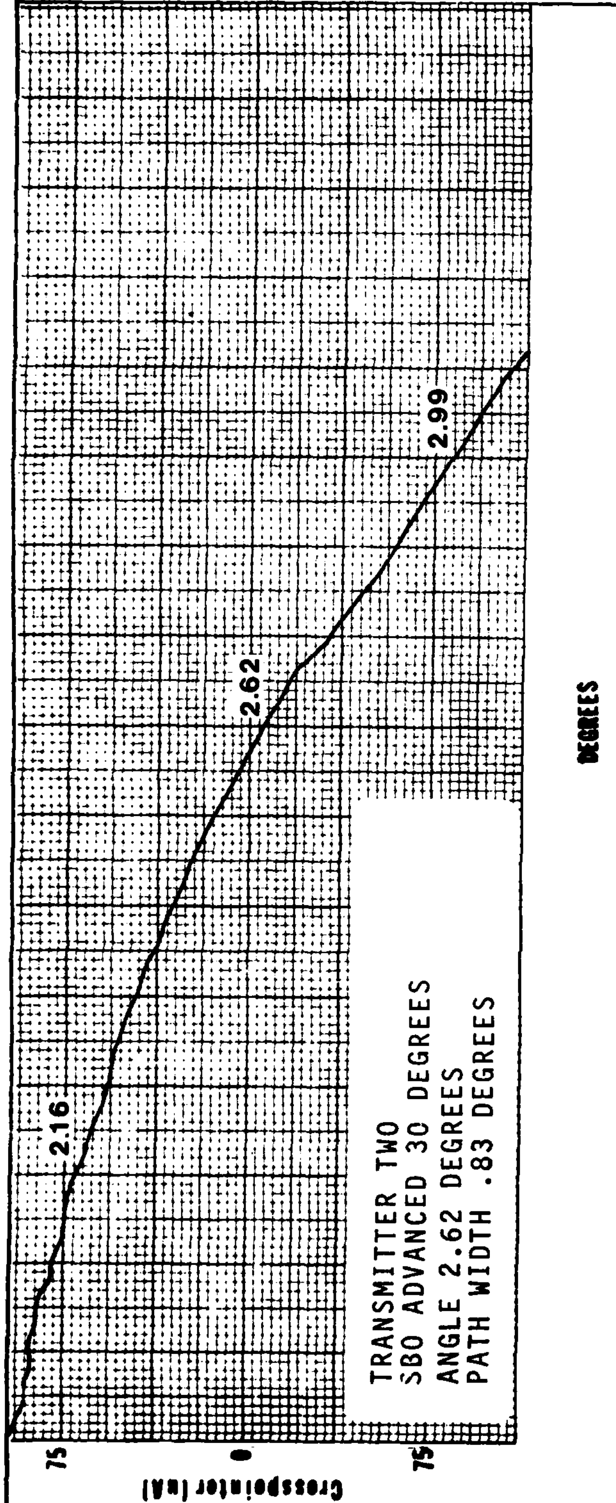
REMARKS

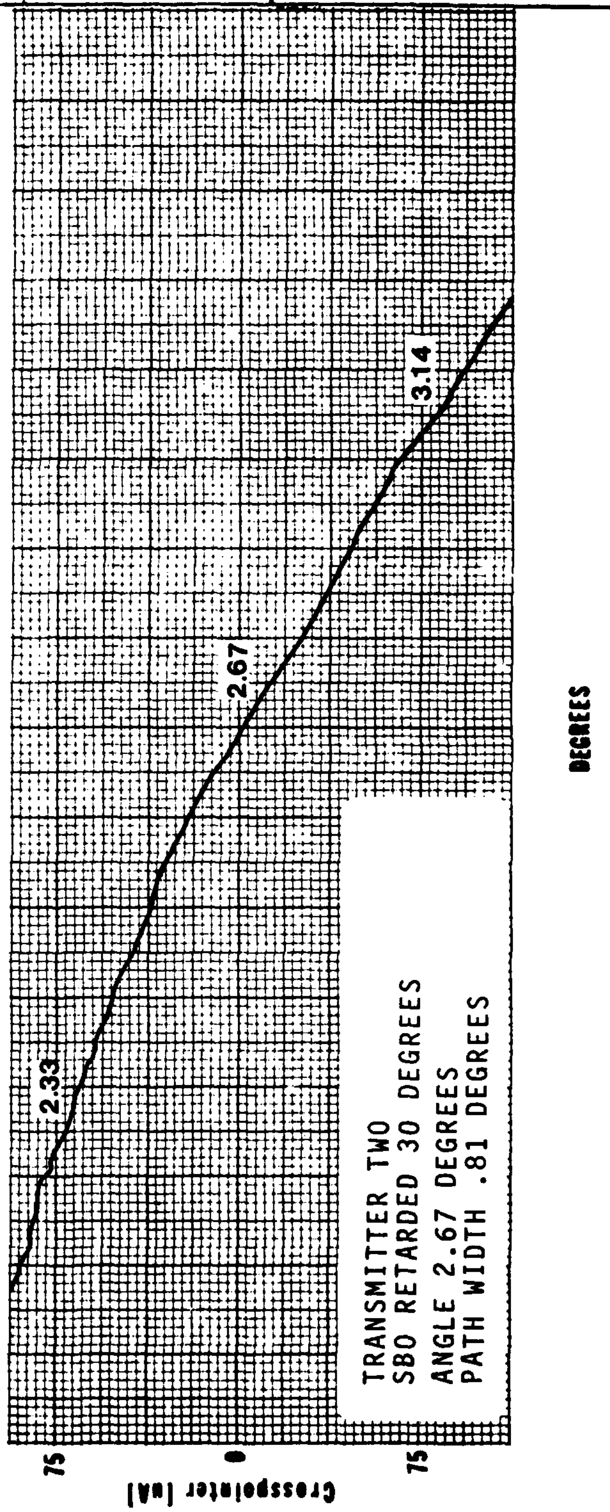
AFCS FORM MAY 73 906 GENERAL INFORMATION

TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION	DATE
Dyess AFB	23 February 1980



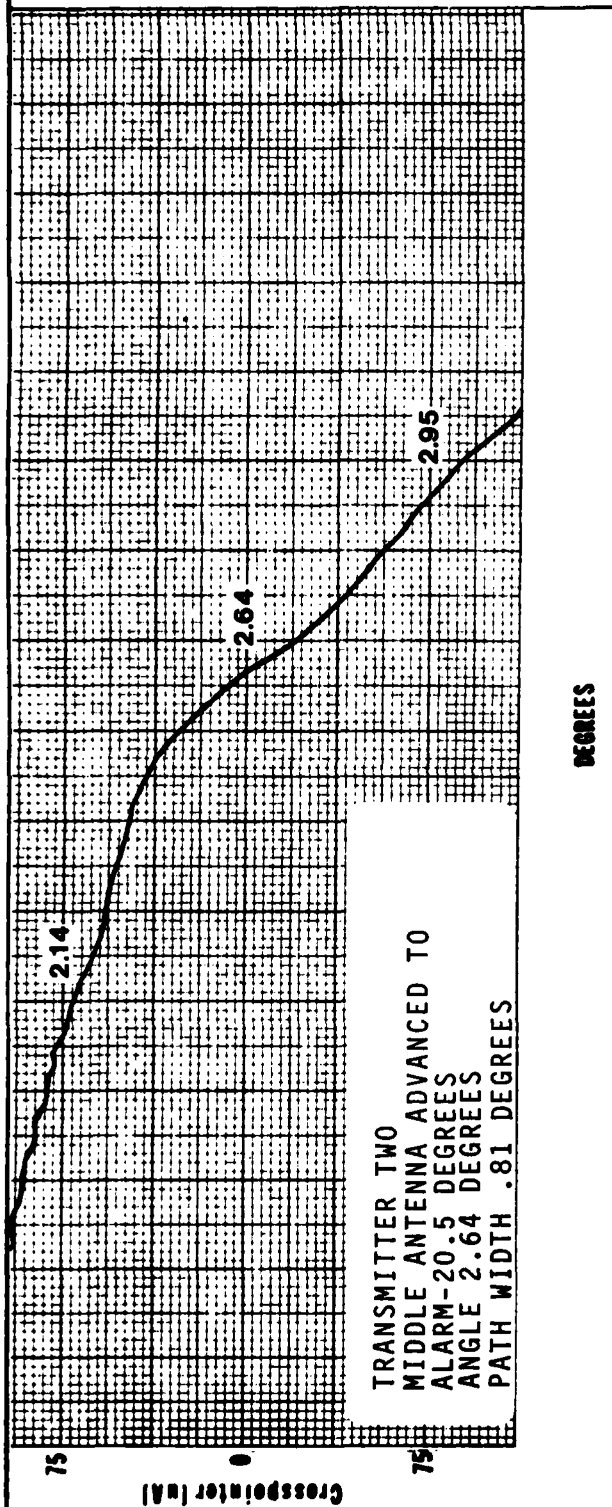


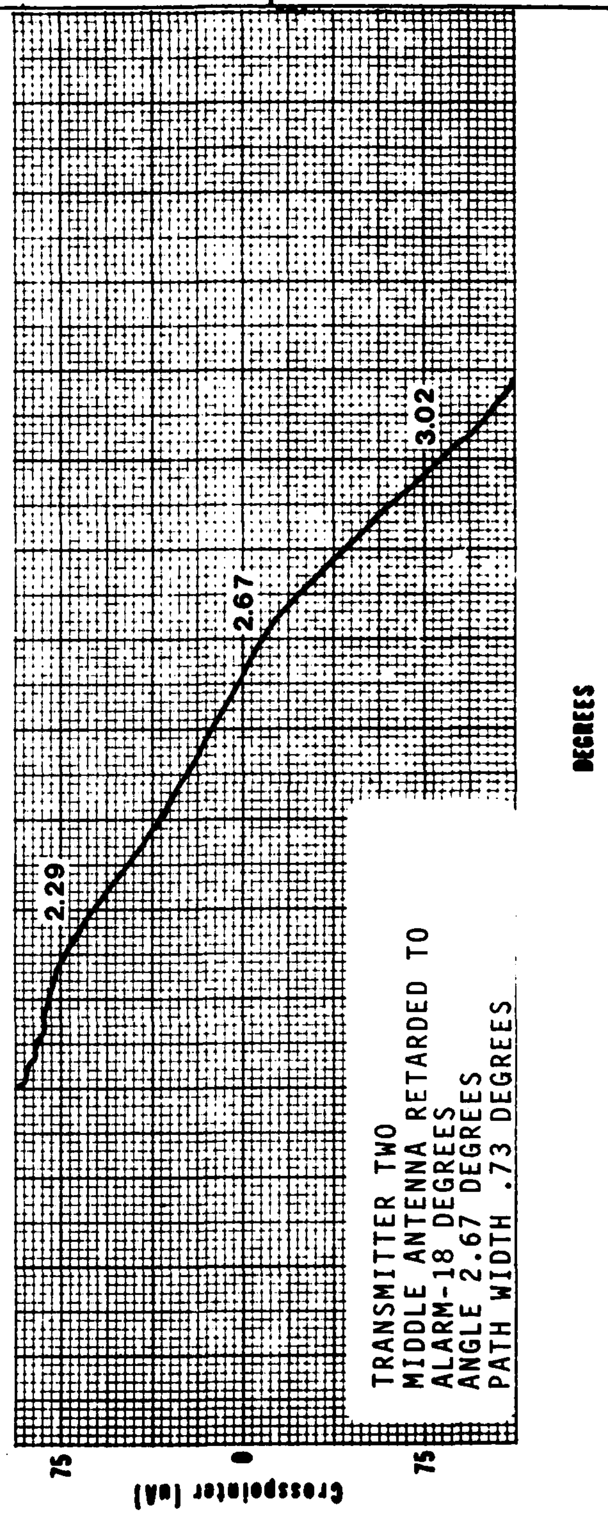
REMARKS

TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION	DATE
Dyess AFB	23 February 1980





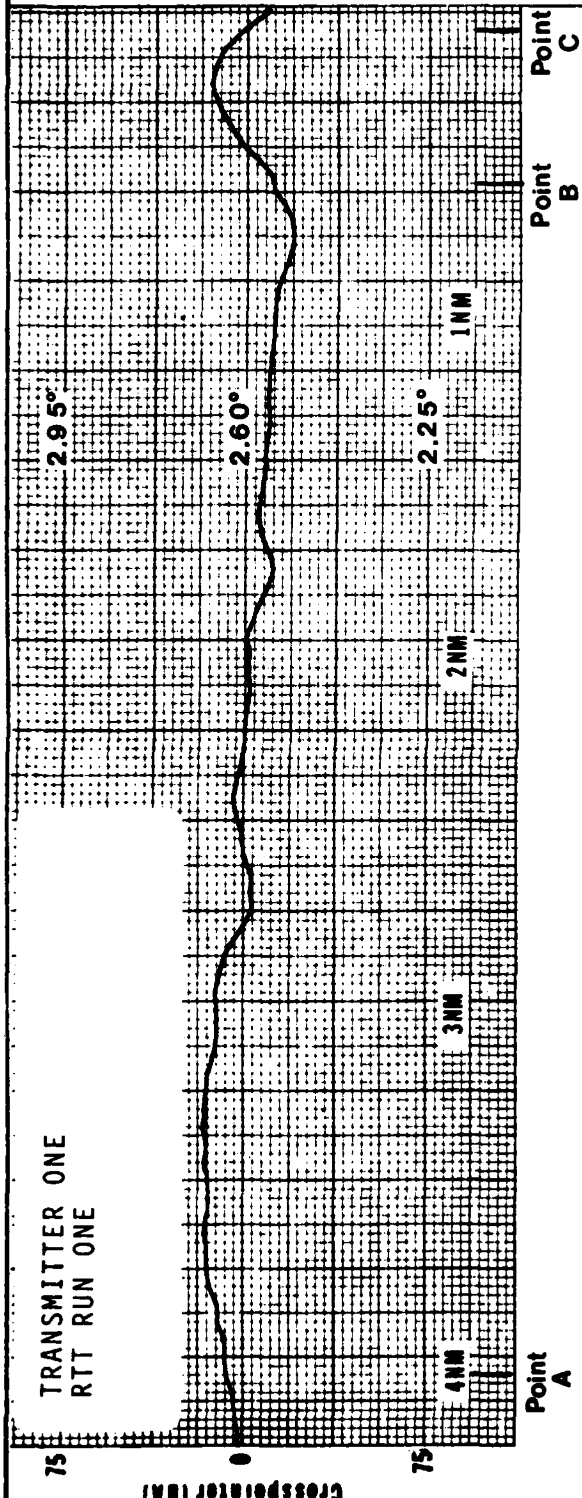
REMARKS

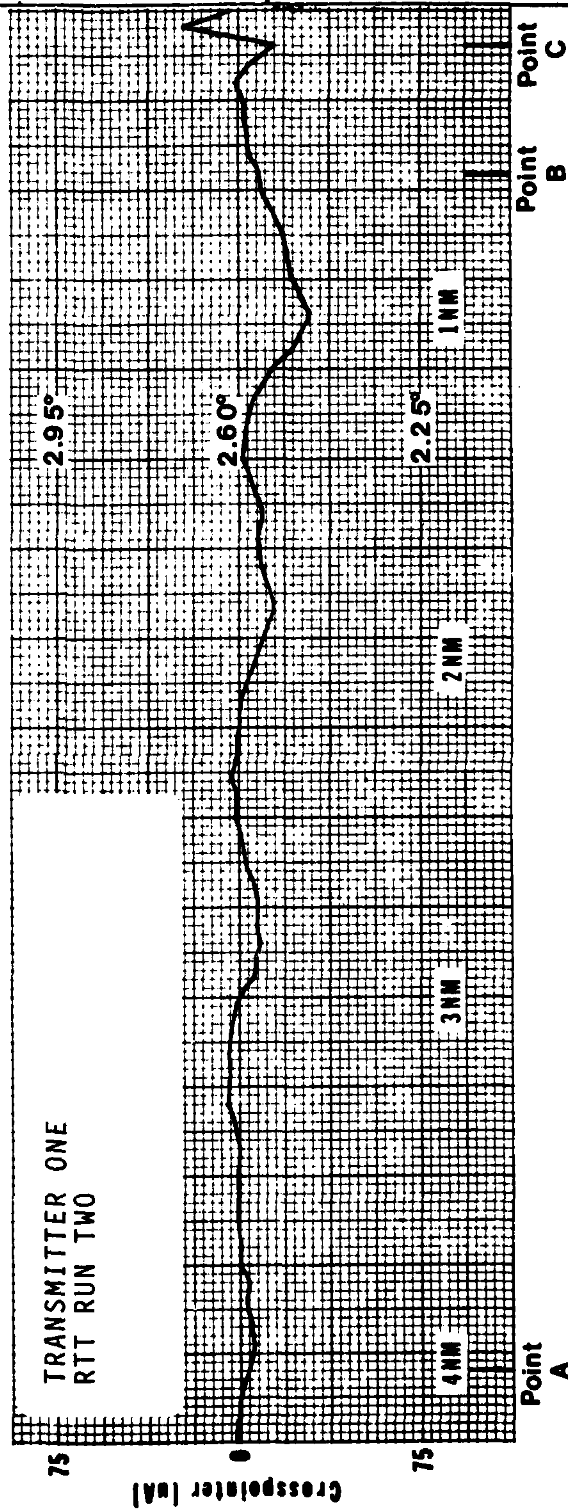
TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION: Dyess AFB

DATE: 23 February 1980





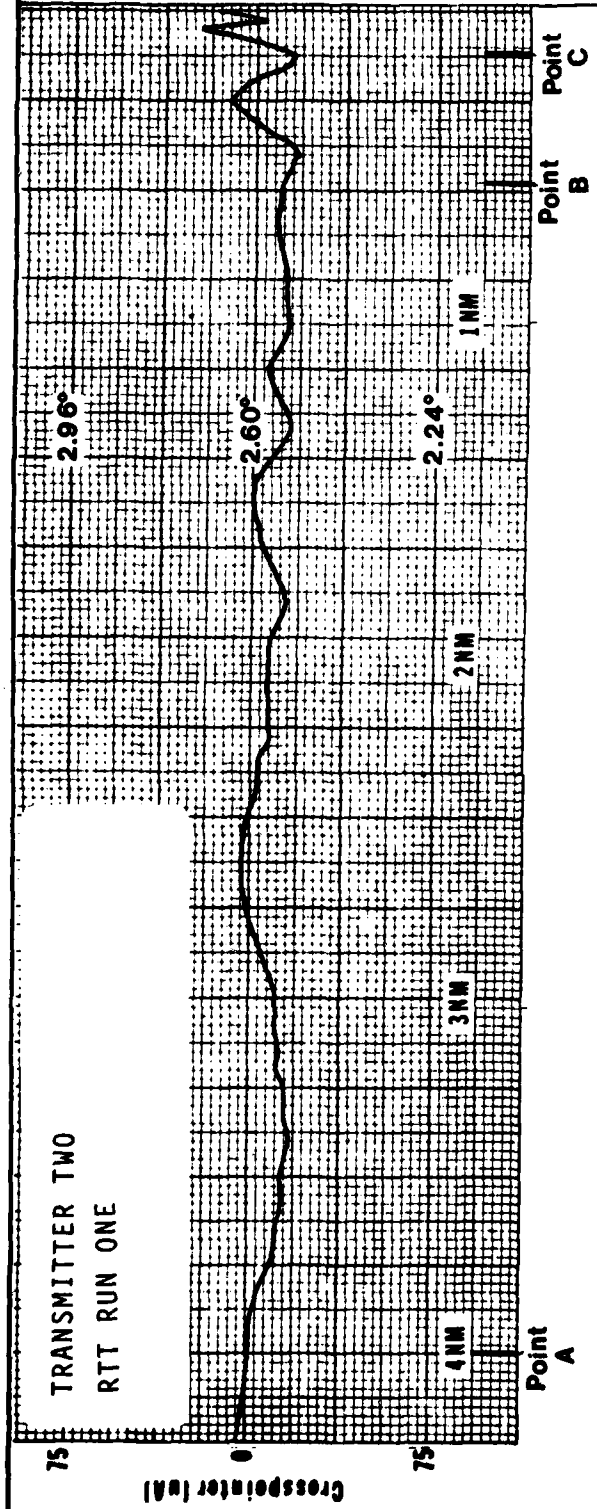
REMARKS

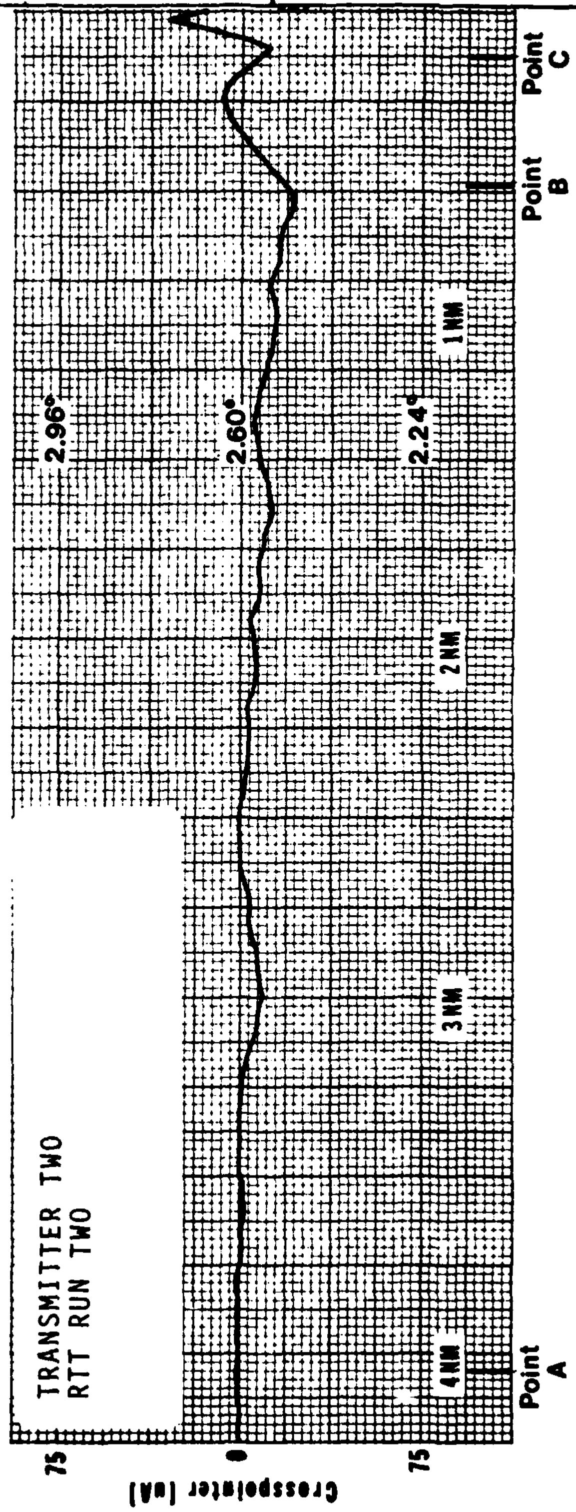
TITLE

GLIDE SLOPE FLIGHT INSPECTION GRAPHS

LOCATION Dyess AFB

DATE 23 February 1980





REMARKS

TITLE

EXPLANATION OF LINEAR REGRESSION TECHNIQUES

LOCATION	DATE
Dyess AFB	February 1980

When investigating the relationship between two variables in the real world, it is a reasonable first step to make experimental observations of the system to gain paired values of the variables, (x,y). The investigator might then ask the question: What mathematical formula best describes the relationship between x and y? His first guess will often be that the relationship is linear, i.e., that the form of the equation is $y = a_1x + a_0$, where a_1 and a_0 are constants. Because a glide path is theoretically linear, a relationship can be developed between the observed glide angle and the distance from the glide slope site. The technique used is linear regression by the method of least squares.

The user must input the paired values of data he has gathered, (x_i, y_i), $i = 1,\ldots,n$. When all data pairs have been input, the regression constants a_1 and a_0 may be calculated according to the following equations.

$$a_1 = \frac{\Sigma xy - \frac{\Sigma x \, \Sigma y}{n}}{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}$$

$$a_0 = \bar{y} - a_1\bar{x}$$

where $\bar{y} = \frac{\Sigma y}{n}$

$$\bar{x} = \frac{\Sigma x}{n}$$

A third value may also be found, the coefficient of determination, r^2. It is calculated according to the following equation.

$$r^2 = \frac{\left[\Sigma xy - \frac{\Sigma x \, \Sigma y}{n}\right]^2}{\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]\left[\Sigma y^2 - \frac{(\Sigma y)^2}{n}\right]}$$

The value of r^2 will lie between 0 and 1 and will indicate how closely the equation fits the experimental data: the closer r^2 is to 1, the better the fit.

REMARKS

The above is taken from the Hewlett-Packard HP-25 Applications Programs Handbook

TITLE:

EXPLANATION OF POWER CURVE FIT

LOCATION: Dyess AFB

DATE: February 1980

When investigating the glide path information in the far field, it is seen that the antenna system, because of the "a" spacing, acts as a point source at ground elevation, i.e., that the glide path acts as a straight line. However, in the near field, the antenna "a" spacing becomes significant in relation to the distance from the facility. In particular, the only function which will satisfy the boundary conditions associated with the problem, is the power function. To find the particular parameters which will best satisfy the data, the following program fits the power curve.

This program fits a power curve $y = ax^b \quad (a > o)$

to a set of points $\left[(x_i, y_i),\ i = 1, 2, \ldots, n\right]$

where $x_i > 0, y_i > 0$

By writing the equation as $\ln y = b \ln x + \ln a$

the problem can be solved as a linear regression problem.

1. Regression coefficients

$$b = \frac{\Sigma[\ln x_i][\ln y_i] - \dfrac{[\Sigma \ln x_i][\Sigma \ln y_i]}{n}}{\Sigma[\ln x_i]^2 - \dfrac{[\Sigma \ln x_i]^2}{n}}$$

$$a = \exp\left[\frac{\Sigma \ln y_i}{n} - b\,\frac{\Sigma \ln x_i}{n}\right]$$

2. Coefficient of determination

$$r^2 = \frac{\left[\Sigma[\ln x_i][\ln y_i] - \dfrac{[\Sigma \ln x_i][\Sigma \ln y_i]}{n}\right]^2}{\left[\Sigma[\ln x_i]^2 - \dfrac{[\Sigma \ln x_i]^2}{n}\right]\left[\Sigma[\ln y_i]^2 - \dfrac{[\Sigma \ln y_i]^2}{n}\right]}$$

3. Estimated value $\hat{y}$ for a given x $\quad \hat{y} = ax^b$

NOTE: n is a positive interger, and $n \neq 1$

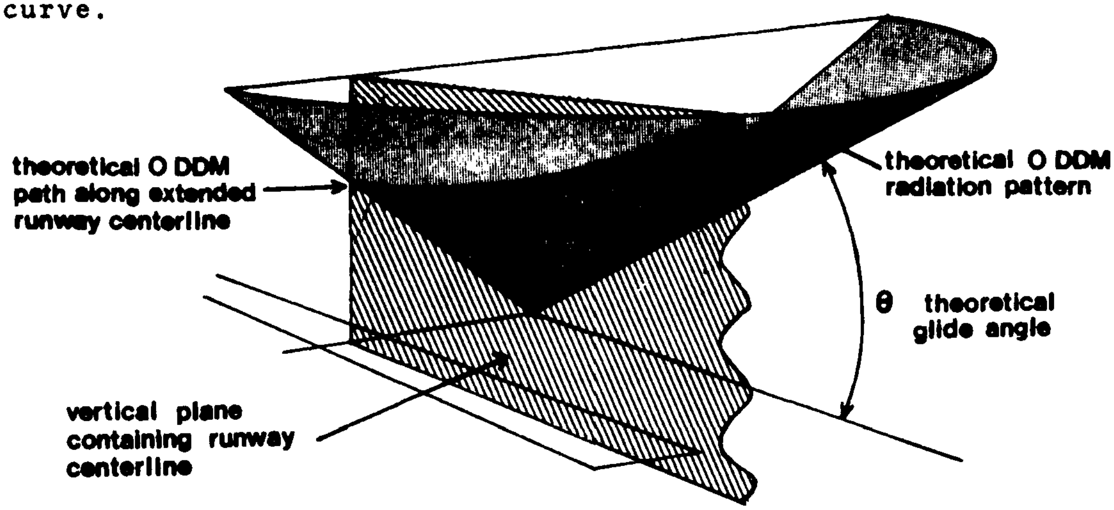
REMARKS: The above is taken from the Hewlett-Packard HP-25 Applications Programs Handbook.

TITLE:

EXPLANATION OF GLIDE SLOPE HYPERBOLIC CURVE MODEL

LOCATION	DATE
Dyess AFB	February 1980

In developing a feasible model for the glide slope it can be convenient to approximate the shape of the radiated glide path as an inverted cone with its point at the base of the antennas and the angle of its side with the horizontal as the glide angle. Then by conic section theory, if a vertical plane containing the runway centerline is passed through this inverted cone, the intersection between the two surfaces is a hyperbolic curve, with an asymptote of the glide angle. In this manner, the 0 DDM path can be modeled by a hyperbolic curve.



THEORETICAL HYPERBOLIC GLIDE SLOPE

The general equation for a hyperbolic curve is:

$$y^2/b^2 - x^2/a^2 = 1$$

which can be rewritten as:

$$\ln y = \ln b + 1/2 \ln z$$

$$\text{where} \qquad z = 1 + x^2/a^2$$

The constant a is computed by an iterative solution of:

$$1/2 = \frac{\Sigma(\ln z)(\ln y) - \frac{(\Sigma \ln z)(\Sigma \ln y)}{n}}{\Sigma(\ln z)^2 - \frac{(\Sigma \ln z)^2}{n}}$$

$$\text{then} \qquad b = e^{\left(\frac{\Sigma \ln y}{n} - \frac{1}{2}\frac{\Sigma \ln z}{n}\right)}$$

coefficient of determination

$$r^2 = \frac{\left[\Sigma(\ln z)(\ln y) - \frac{(\Sigma \ln z)(\Sigma \ln y)}{n}\right]^2}{\left[\Sigma(\ln z)^2 - \frac{(\Sigma \ln z)^2}{n}\right]\left[\Sigma(\ln y)^2 - \frac{(\Sigma \ln y)^2}{n}\right]}$$

EXPLANATIONS OF GLIDE SLOPE COMPUTER MODELING RESULTS

1. Equations and Constants. The table illustrates the general form of the equations for each model. The constants A and B are calculated in the program and shown in the table. The variables X and Y represent the distance from the glide slope facility and the elevation above the antenna tower base, respectively.

2. Coefficient of Determination. The coefficient of determination provides an indication of how well the model equation fits the actual data. The closer the coefficient of determination is to 1, the better the fit. Coefficients of determination are not produced for the Average Angle and Hyperbolic Models.

3. Area Difference and Average Height Difference Between Curves. The area difference between the actual data and the models is found as shown below.

The net area is shown shaded. The computer sums these area segments over the distance the data was collected, usually from Point A to Point B. The average height difference is the average of the differences in height between the actual data and the model at each data point. The height difference indicates that, on the average, the actual data lies either above or below the model within that height difference.

4. Standard Deviations and Confidence Limits. The standard deviation provides a measure of the dispersion of the individual height differences around the average height difference. The confidence limits are added to the average height difference to provide a range above and below the model where it is 99 % certain the actual height difference lies.

5. Glide Angle. Once the equations for each model are determined, the glide angles are calculated as shown below, with A and B the equation constants from the table.

$$\text{Glide Angle} = \begin{cases} A & \text{(for Average Angle Model)} \\ \tan^{-1}(B) & \text{(for Linear Model)} \\ \tan^{-1}(A) & \text{(for Power Model)} \\ \tan^{-1}(B/A) & \text{(for Hyperbolic Model)} \end{cases}$$

6. Heights at Point A, Point B, and at Threshold. The heights of each model at Point A, Point B, and at threshold are referenced above the antenna tower base.

7. Maximum Observed Excursion from Each Model. This portion of the program chooses the largest height difference between the actual data and each model, displaying it in feet, degrees and uA. A positive value indicates the actual data lies above the model. A negative value indicates the actual data lies below the model. This provides an indication of the "structure" of the actual data in the interval in which the data points were taken, usually from Point A to Point B.

TITLE:

GLIDE SLOPE STRUCTURE COMPUTER ANALYSIS

LOCATION: Dyess AFB

DATE: February 1980

DYESS AFB NOV79 RR1 TX1 RWY16

TABULATION OF PROGRAM RESULTS

	AVERAGE ANGLE* VERSUS ACTUAL DATA	LINEAR MODEL VERSUS ACTUAL DATA	POWER MODEL VERSUS ACTUAL DATA	HYPERBOLIC MODEL VERSUS ACTUAL DATA
EQUATION	Y=X*TAN(A)	Y=B*X+A	$Y=A*X^B$	$X^2/B^2-Y^2/A^2=1$
CONSTANT A	2.57 DEGREES	-10.46206748	0.03639807	0.50000000
CONSTANT B	---------	0.04377597	1.02265351	0.02253117
COEFFICIENT OF DETERMINATION	---------	0.99957532	0.99957237	---------
AREA DIFFERENCE BETWEEN CURVES	238043.45 SQ FT	100122.21 SQ FT	102474.21 SQ FT	120422.12 SQ FT
AVERAGE HEIGHT DIFFERENCE BETWEEN CURVES	6.632 FT	4.791 FT	4.870 FT	5.767 FT
AVERAGE HEIGHT STD DEVIATION	4.897 FT	3.055 FT	3.562 FT	3.789 FT
99 PERCENT CONFIDENCE LIMITS	1.421 FT	0.830 FT	1.035 FT	1.101 FT
GLIDE ANGLE	2.572 DEGREES	2.621 DEGREES	---------	2.592 DEGREES
HEIGHT AT POINT A	1145.627 FT	1157.191 FT	1161.281 FT	1154.549 FT
HEIGHT AT POINT B	211.268 FT	204.868 FT	206.318 FT	212.914 FT
HT. AT THRESHOLD	56.981 FT	47.614 FT	54.069 FT	57.424 FT
MAXIMUM OBSERVED EXCURSION FROM EACH MODEL	19.280 FT 11.396 UA 0.053 DEGREES	-12.456 FT -6.120 UA 0.029 DEGREES	-16.159 FT -7.940 UA 0.037 DEGREES	-14.990 FT -25.162 UA 0.117 DEGREES

* BASED ON DEFINITION OF AVERAGE PATH ANGLE PRESENTED IN AFM 55-8, SECTION 217.

REMARKS

Attachment 17

TITLE:

GLIDE SLOPE STRUCTURE COMPUTER ANALYSIS

LOCATION: Dyess AFB

DATE: February 1980

DYESS AFB NOV79 RN2 TX1 RWY16

TABULATION OF PROGRAM RESULTS

	AVERAGE ANGLE* VERSUS ACTUAL DATA	LINEAR MODEL VERSUS ACTUAL DATA	POWER MODEL VERSUS ACTUAL DATA	HYPERBOLIC MODEL VERSUS ACTUAL DATA
EQUATION	Y=X*TAN(A)	Y=B*X+A	$Y=A*X^{B}$	$Y^2/B^2-X^2/A^2=1$
CONSTANT A	2.60 DEGREES	-13.81847084	0.03631324	0.50000000
CONSTANT B	--------	0.04652752	1.02346671	0.02288258
COEFFICIENT OF DETERMINATION	--------	0.99954498	0.99956344	--------
AREA DIFFERENCE BETWEEN CURVES	165611.67 SQ FT	98460.36 SQ FT	100433.22 SQ FT	135301.56 SQ FT
AVERAGE HEIGHT DIFFERENCE BETWEEN CURVES	7.810 FT	4.697 FT	4.756 FT	6.412 FT
AVERAGE HEIGHT STD DEVIATION	4.679 FT	3.576 FT	3.750 FT	4.011 FT
99 PERCENT CONFIDENCE LIMITS	1.360 FT	1.040 FT	1.090 FT	1.166 FT
GLIDE ANGLE	2.600 DEGREES	2.664 DEGREES	--------	2.620 DEGREES
HEIGHT AT POINT A	1158.459 FT	1173.005 FT	1175.308 FT	1167.378 FT
HEIGHT AT POINT B	213.634 FT	205.047 FT	208.311 FT	215.279 FT
HT. AT THRESHOLD	57.619 FT	45.211 FT	54.482 FT	58.063 FT
MAXIMUM OBSERVED EXCURSION FROM EACH MODEL	17.730 FT 10.452 UA 0.049 DEGREES	-13.050 FT -13.966 UA 0.065 DEGREES	14.081 FT 11.064 UA 0.052 DEGREES	-17.803 FT -19.053 UA 0.089 DEGREES

* BASED ON DEFINITION OF AVERAGE PATH ANGLE PRESENTED IN AFM 55-8, SECTION 217.

REMARKS

TITLE:

GLIDE SLOPE STRUCTURE COMPUTER ANALYSIS

LOCATION: Dyess AFB

DATE: February 1980

DYESS AFB NOV79 RN1 TX2 RWY16

TABULATION OF PROGRAM RESULTS

	AVERAGE ANGLE* VERSUS ACTUAL DATA	LINEAR MODEL VERSUS ACTUAL DATA	POWER MODEL VERSUS ACTUAL DATA	HYPERBOLIC MODEL VERSUS ACTUAL DATA
EQUATION	Y=X*TAN(A)	Y=B*X+A	$Y=A*X^{B}$	$Y^2/B^2-X^2/A^2=1$
CONSTANT A	2.56 DEGREES	1.47399292	0.04371131	0.50000000
CONSTANT B	--------	0.04466065	1.00240133	0.02237526
COEFFICIENT OF DETERMINATION	--------	0.99921643	0.99954579	--------
AREA DIFFERENCE BETWEEN CURVES	221670.17 SQ FT	122901.54 SQ FT	122750.64 SQ FT	180615.94 SQ FT
AVERAGE HEIGHT DIFFERENCE BETWEEN CURVES	5.775 FT	5.826 FT	5.824 FT	5.709 FT
AVERAGE HEIGHT STD DEVIATION	4.750 FT	4.619 FT	4.934 FT	4.835 FT
90 PERCENT CONFIDENCE LIMITS	1.381 FT	1.343 FT	1.434 FT	1.405 FT
GLIDE ANGLE	2.562 DEGREES	2.557 DEGREES	--------	2.562 DEGREES
HEIGHT AT POINT A	1141.496 FT	1140.678 FT	1143.185 FT	1141.496 FT
HEIGHT AT POINT B	210.506 FT	211.558 FT	209.942 FT	210.506 FT
HT. AT THRESHOLD	56.775 FT	58.135 FT	56.441 FT	56.775 FT
MAXIMUM OBSERVED EXCURSION FROM EACH MODEL	16.665 FT 11.737 UA 0.056 DEGREES	16.736 FT 11.787 UA 0.056 DEGREES	16.276 FT 11.463 UA 0.054 DEGREES	16.874 FT 11.884 UA 0.056 DEGREES

* BASED ON DEFINITION OF AVERAGE PATH ANGLE PRESENTED IN AFM 55-8, SECTION 217.

REMARKS

TITLE:

GLIDE SLOPE STRUCTURE COMPUTER ANALYSIS

LOCATION: Dyess AFB

DATE: February 1980

DYESS AFB NOV79 RW2 TX2 RWY16

TABULATION OF PROGRAM RESULTS

	AVERAGE ANGLE* VERSUS ACTUAL DATA	LINEAR MODEL VERSUS ACTUAL DATA	POWER MODEL VERSUS ACTUAL DATA	HYPERBOLIC MODEL VERSUS ACTUAL DATA
EQUATION	Y=X*TAN(A)	Y=B*X+A	Y=A*X^B	$Y^2/B^2-X^2/A^2=1$
CONSTANT A	2.57 DEGREES	-10.38403857	0.03742596	0.50000000
CONSTANT B	--------	0.04574244	1.01911545	0.02253039
COEFFICIENT OF DETERMINATION	--------	0.99985176	0.99992597	--------
AREA DIFFERENCE BETWEEN CURVES	107396.01 SQ FT	51760.32 SQ FT	40878.20 SQ FT	92145.15 SQ FT
AVERAGE HEIGHT DIFFERENCE BETWEEN CURVES	5.109 FT	2.477 FT	2.349 FT	4.400 FT
AVERAGE HEIGHT STD DEVIATION	3.810 FT	2.307 FT	2.387 FT	2.526 FT
99 PERCENT CONFIDENCE LIMITS	1.107 FT	0.671 FT	0.694 FT	0.735 FT
GLIDE ANGLE	2.571 DEGREES	2.619 DEGREES	--------	2.581 DEGREES
HEIGHT AT POINT A	1145.409 FT	1156.414 FT	1159.004 FT	1149.867 FT
HEIGHT AT POINT B	211.228 FT	204.788 FT	206.938 FT	212.050 FT
HT. AT THRESHOLD	56.970 FT	47.650 FT	54.432 FT	57.192 FT
MAXIMUM OBSERVED EXCURSION FROM EACH MODEL	14.815 FT 7.251 UA 0.034 DEGREES	-10.694 FT -6.810 UA 0.032 DEGREES	-10.428 FT -6.640 UA 0.031 DEGREES	10.638 FT 5.205 UA 0.025 DEGREES

* BASED ON DEFINITION OF AVERAGE PATH ANGLE PRESENTED IN AFM 55-8, SECTION 227.

REMARKS